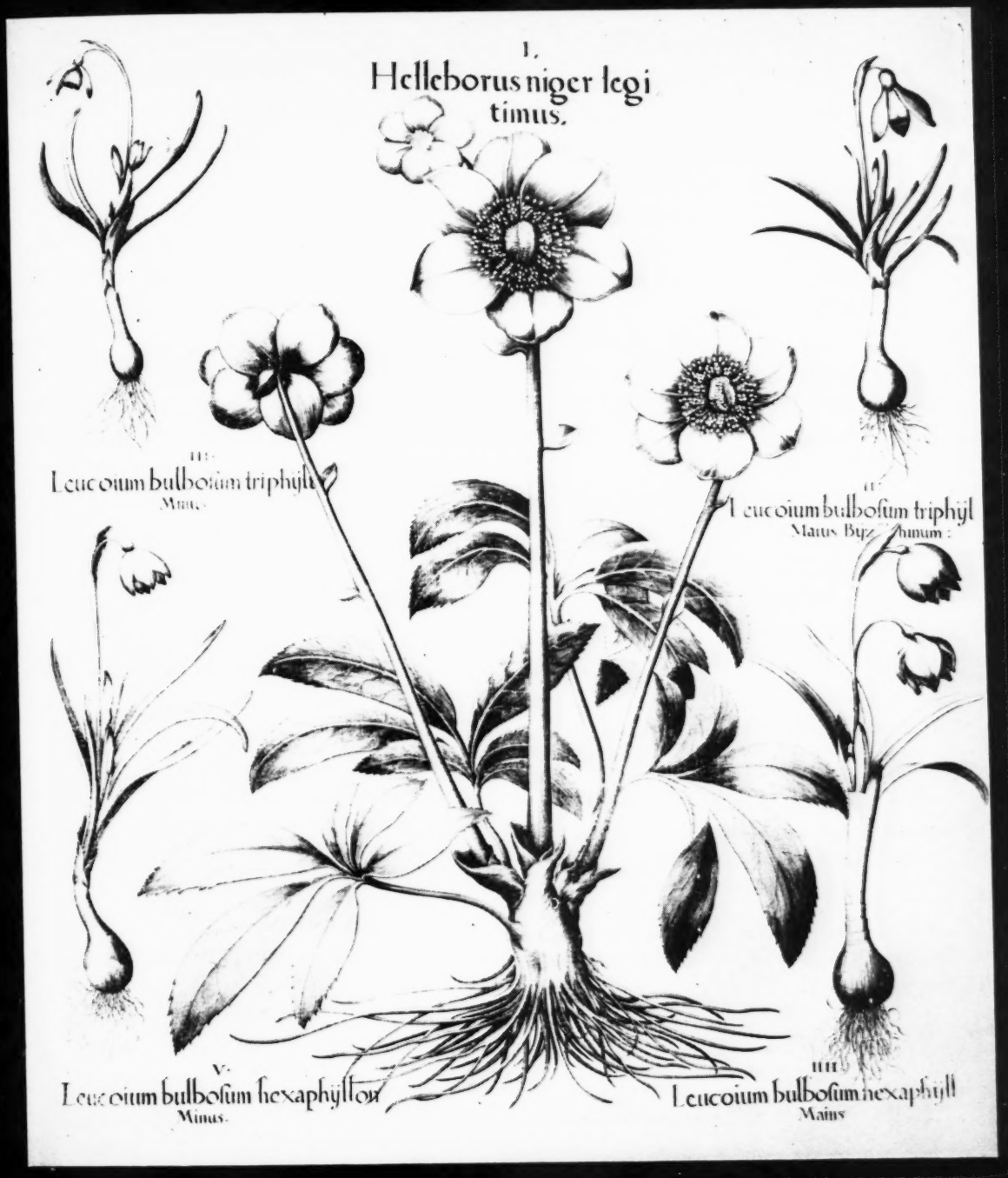
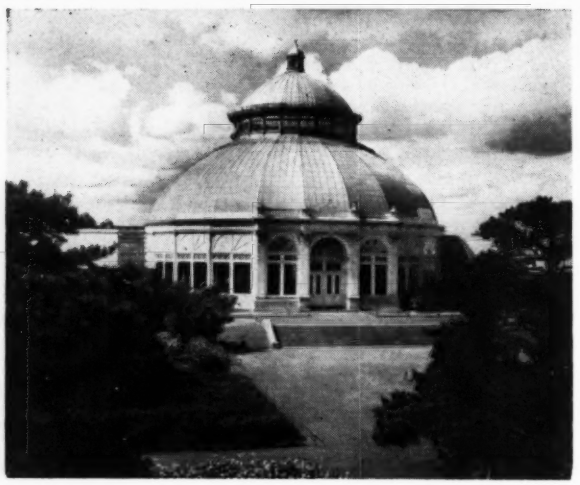


THE GARDEN JOURNAL

OF THE NEW YORK BOTANICAL GARDEN

Vol. 5, No. 1 Jan.- Feb., 1955



House Plant Show in the Conservatory of The New York Botanical Garden January 28- February 13.

Early Bulb Show in the Conservatory of The New York Botanical Garden, February 25 - March 13.

Display of Dried Arrangements in the Museum and Administration Building of The New York Botanical Garden, middle of January. See page 31.

Annual Members' Day, auditorium of French Institute Building, 22 E. 60th Street, New York City, afternoon of February 10. Prominent speaker to be announced later.

Downtown Lecture Series of The New York Botanical Garden in the auditorium of French Institute Building, January 6, 13, 20, 27. See page 30.

"Landscaping for Beginners"—course of lectures by The New York Botanical Garden on six consecutive Thursday evenings starting March 16 in auditorium of French Institute Building. Details later.

THE GARDEN JOURNAL

of the New York Botanical Garden

DOROTHY EBEL HANSELL

Editor

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CREDIT FOR ILLUSTRATIONS

New cover design by Mrs. Charles Burlingham and Mrs. Donald B. Straus; front cover illustration from *Hortus Eystettensis*—see p. 13; p. 2, Berguis Garden, Stockholm, Sweden; p. 3, Botanical Garden of the University of Copenhagen, Denmark; pp. 6, 7, 8, 9, U.S.D.A. photographs; pp. 10, 11, The New York Botanical Garden; pp. 14, 15, Jake Gerling; pp. 22, 23, E. N. Mitchell; pp. 24, 25, 26, Elise Ludlam Bowles; p. 30, upper, Brown, Lawford & Forbes, lower, E. N. Mitchell; p. 31, upper, Hugelmeyer —courtesy Mrs. Stafford Hendrix, lower, The Wayside Gardens Co.

The Garden Journal of The New York Botanical Garden is published bimonthly by The New York Botanical Garden, Bronx Park, New York 58, N. Y. Printed in U. S. A. Re-entered as Second Class Matter, February 1, 1951, at the Post Office at New York, N. Y., under the Act of August 24, 1912. Annual subscription, $2.00. Single copies 35 cents. Foreign countries and anywhere outside the continental United States, 50 cents a year extra.

Notes on a Visit to Europe - Summer 1954

By William J. Robbins

In 1928 and 1929 Mrs. Robbins and I spent two years in Europe. At that time I was associated, first, with the International Education Board and later with the Rockefeller Foundation in their program of post-doctoral fellowships for Europeans. In the course of my duties, I visited laboratories and interviewed scientists and candidates for fellowships in all countries in Europe, from Russia to Ireland, and from Norway and Sweden to Italy, with the exception of Portugal, Spain, Greece, and Turkey. It was, therefore, with considerable interest that Mrs. Robbins and I returned to Europe for a brief period last summer, during which we spent two weeks in Paris at the International Botanical Congress and the balance of the time in Holland, Denmark, Sweden, and England.

It was not possible in the time at our disposal to make anything like a detailed survey of the status of scientific institutions and to compare the situation now with that which existed some twenty-five years ago. Nevertheless, a few observations may be of interest.

There is only one Paris, and we enjoyed not only our contacts with the botanists who attended the International Botanical Congress, but the opportunity to renew our acquaintance with that lovely city. We were saddened to see parts of Paris run down at the heel; for example, the empty shops in the Arcades of the Palais Royale, which at the time of our earlier stay were showplaces. We were disappointed in the way car parking had destroyed, in part, the beauty of the Champs Elysees. We were impressed with the memorial plaques with pitiful little bouquets of flowers alongside them; these record the death of some young man shot by the Germans *(fusillé par les Allemands)* during the occupation and liberation of Paris in the last war. Such concrete demonstrations of grief helped us to understand why the French have been so reluctant to approve any agreement involving the rearming of Germany. Contrary to rumors which we heard before we visited Paris, the French people were friendly and helpful, and we experienced no evidence of any antagonism.

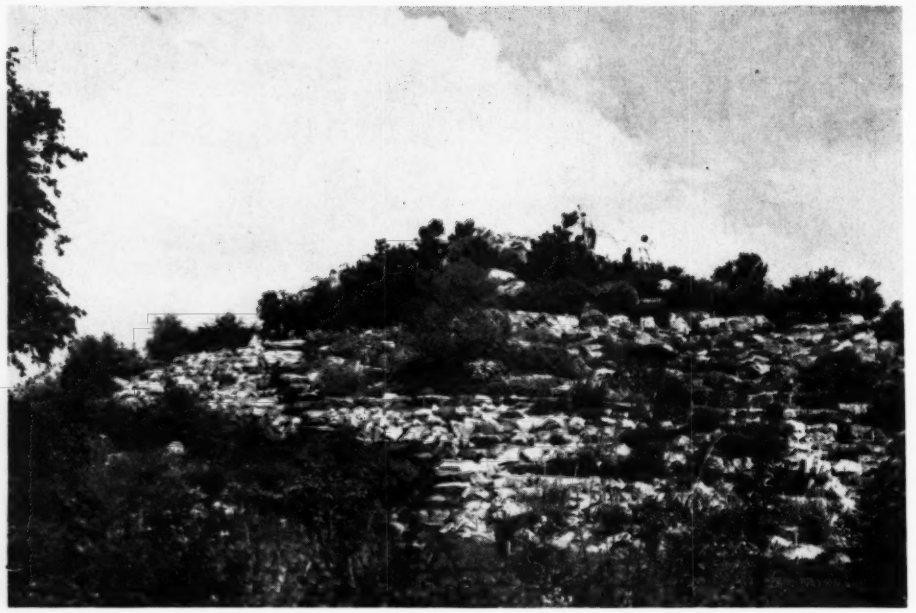
The Botanical Congress itself occupied a substantial part of our time. It was most notable, not only because of the opportunity of meeting botanists from all parts of the world—each absorbed in his special field and problem—but because the organizers of the Congress had arranged visits to many places of interest in Paris and its vicinity. We took advantage of these arrangements and, in addition, made some excursions on our own.

We visited the Parc de Bagatelle twice to enjoy its lovely and famous rose garden, its broad lawns and old trees, its plantings of clematis, some of which were in full bloom, and its fine collection of water-lilies. Among the notable trees we saw at the Bagatelle were two specimens of *Sequoia gigantea,* planted in 1830, which had suffered severely from last winter's cold; a fine cedar of Lebanon, some sixty-five feet high, planted in 1810; two magnificent specimens of *Platanus,* one *P. orientalis,* the other *P. acerifolia (P. occidentalis* x *orientalis)* growing side by side and offering opportunity to compare their characters; and an excellent example of variation in the seedlings of *Quercus Robur.*

We were the guests of M. and Mme. Roger de Vilmorin at their gardens at Verrieres. They were most gracious in showing us their gardens and sharing their unique fund of information. I was particularly interested to see daylilies in bloom, and when one of the party asked about them, M. de Vilmorin said, "They were given to me by my friend, Dr. A. B. Stout of The New York Botanical Garden." Many of the trees in the Arboretum Vilmorianum were planted by M. de Vilmorin's great-grandfather in the time of Louis XIV, but additions have been made by later members of this remarkable family. It is not possible to list all the interesting items in this arboretum. We noted the finest specimen of *Sequoia gigantea* in France, one hundred twenty feet high and over one hundred years old; a cedar of Lebanon one hundred fifty years old; *Parrotia persica* with a profusion of natural grafts; a collection of Japanese oaks which are quite un-oaklike in appearance; a fir from Sicily, of which only three specimens are left in its native habitat; a fine specimen of *Hedera helix arborescens,* perhaps ten feet in diameter and nearly as tall.

We made three trips to the Jardin des Plantes. Because of its location and design, it is not a garden with extensive collections of living woody plants. There are, however, some interesting trees, including a specimen of *Acer creticum* planted by Tournefourt in 1702. There is also a garden of herbs and cultivated plants, well labeled, which attracts considerable public interest. Their rock garden contains more than three thousand species and varieties, beautifully kept and well labeled. We saw in the Conservatory, through the courtesy of the Sous Directeur, M. A. G. Hamel, a newly-established display of some two thousand species of cacti and succulents, which in variety exceeds anything we have now or have had in the past at The New York Botanical Garden. We visited twice the exhibition of books, manuscripts, and paintings displayed by the archivist and librarian, Mme. Duprat, who was most gracious in extending to us the resources of that notable library and aiding us in answering some of the questions we had in mind. Mme. Duprat reminded us of our own librarian, Miss Hall, because of her helpfulness and friendly interest in our problems.

On display were sixty-four original paintings by Nicholas Robert (1614-1684), thirty-three by Gerard van



The rock garden in the Berguis garden in Stockholm

Spaendonck (1746 - 1822), sixteen by Pierre Joseph Redouté (1759-1822), fifty-eight by Anthony Claes Hollandais, early arabic and Italian herbals, and, in addition, cloth, china, tapestries, and other items with decorations based on plants. The exhibit was an excellent demonstration of the botanical riches of Paris. In the display we saw some water colors of fleshy fungi from Ohio with penciled notes, such as "Found twice while plowing." We wondered who the plowman might have been, who was sufficiently interested in mushrooms and toadstools to describe them and record them in watercolor. We found through the aid of Mme. Duprat that the paintings were made by John Robinson in 1848-49. They were given to the museum by Sullivant, well known as a great bryologist in the United States. Who John Robinson was I have not been able to discover, but it is certain that he must have been a very unusual man.

We paid a visit to the Parc de Jussieu, which was planned to be an extensive botanical garden to adjoin the park and chateau at Versailles. It was begun after World War I, and many fine evergreens were planted in broad allées so typical of French landscaping genius. Unfortunately, funds to complete and maintain the project were not available, and a considerable part of the area is now devoted to subsistence gardens. The Parc de Jussieu would supplement the Jardin des Plantes, which cannot be an extensive arboretum because of its limited area and its location in the heart of Paris.

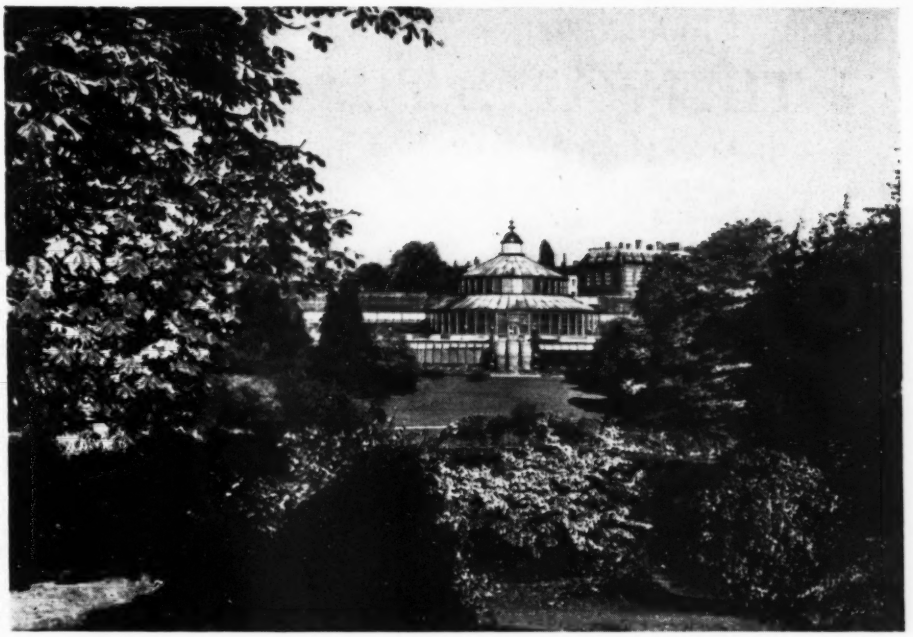
Mrs. Robbins and I visited the home and burial place of François André Michaux. We went by train to Pontoise, an interesting old town on the Oise River, and then by taxi to Vauréal where Michaux had his home and where he and his wife are buried behind the house in the garden. The tombstone bears the legend: "Ici reposent André François Michaux, né à Versailles en 1770 decédé Mairie de Vauréal le 23 Octobre 1855 et Marguirite Guerdet sa veuve decédé a Vauréal 29 Mai 1870."

This property has been purchased by M. Guffrier, a resident of Paris, who, I am glad to say, is rehabilitating the house and garden. In the garden we found trees brought by Michaux from America and planted there. These included two honey locusts, a hazel-nut fifteen to twenty feet high and in fruit, tulip, catalpa, and ash trees. There is also a highly-prized ginkgo planted by Michaux. We had tea with the caretaker Maurice Jourdain, an artist-architect, and his charming daughter, during which we had the opportunity to see the rooms in which Michaux spent the last years of his life.

On returning to Pontoise, we paid a visit to the town library where there is preserved a small painting of Michaux, on the back of which is inscribed "Donné par moi à Mg. Guerdet. 1828." Our visit to Vauréal was the result of information furnished by our friend, Dr. G. Chinard of Princeton, who has long been deeply interested in Michaux.

No comments on our stay in Paris would dare omit a night visit to the Louvre as guests of Dr. Roger Heim, the world-renowned mycologist, who was President of the International Botanical Congress, nor our visit with the Congress to Versailles where we were conducted through the chateau, through

A view of the Berguis garden in Stockholm, Sweden



Botanical Garden of the University, Copenhagen, Denmark

the gardens, and wined and dined in the orangerie. This stone arched structure, thirty-five or forty feet wide and a third of a mile long, was lined on one side with white cloth-covered tables, waiters behind them, and on the other with tables for some three thousand botanists and their guests. After the dinner, the Congress enjoyed a dramatic presentation by recorded script and music of the history of Versailles with illumination of significant parts of the chateau, which added much to the realism of the presentation.

Too much cannot be said for the devoted botanists in Paris who organized and administered the International Botanical Congress, especially Dr. Roger Heim, the President of the Congress, Dr. Pierre Chouard, Secretary-Generale of the Congress, and M. Roger de Vilmorin, who, as president of the Botanical Society of France, addressed the Congress in French, English, German, and Spanish. Their ability to maintain their equanimity, under the pressure of so many wishing so much immediately, was admired by all those who attended the Congress.

From Paris we flew to Amsterdam and settled for a few days in the little suburban town of Baarn, where a collection of eight thousand fungus cultures developed by Dr. Westerdijk is located at the Willie Comerin Foundation. In this small town of some thirty thousand people, there is a botanical garden with greenhouses filled with tropical plants. During our visit it was announced that the night-blooming cereus would be on display. Mrs. Robbins and I went to the Conservatory and stood in line nearly forty-five minutes to enter; this was a good demonstration of the interest of the public in plants.

Aside from visiting Dr. Westerdijk's establishment, I also spent a half-day at the Agricultural Experiment Station at Wageningen, and we visited the wonderful flower market at Aalsmeer and the botanical garden in Amsterdam. This garden is small, and it is necessary to ring a bell and pay a small fee. We saw some good living plant collections, including a very fine *Victoria regia* in flower.

In Copenhagen, I visited the botanical garden and an old friend, Prof. Boysen-Jensen, now retired. The botanical garden in Copenhagen is a typical older type garden with large greenhouses crammed with plants in pots and tubs. The grounds are planted by families and well kept. There are two large rock gardens with fine collections of plants. It appeared to me that they were as extensive as the rock garden in the Jardin des Plantes, but far better landscaped. A special small greenhouse is given over to the *Victoria* and other water plants and there is a series of small outdoor pools, each with a species of water plant. We noticed that the plantings included very few evergreens. We also visited the famous Tivoli, a combination zoo, botanical garden, and Coney Island, which is an amusement center for Copenhagen.

In Stockholm, one of the loveliest cities in Europe, we saw the famous outdoor museum at Skansen, the botanical garden in the suburbs, the re-

(Continued on page 20)

The rock garden in the Copenhagen Botanical Garden

Annals of Medicine

THE WALLS THAT KILL

By **Bernard A. Weisberger and Richard M. Klein**

In the late autumn of 1931, R. H. Ellis, a county analyst serving the British west coast seaport of Gloucester, was called upon to undertake a curiously affecting *post mortem* examination. Ellis's job corresponded to that of an American coroner, and he had been duly advised of the unexplained deaths of two children, a boy and a girl in the same family, both under ten years old. They lived in the Forest of Dean, a district that had once been a royal hunting preserve, but was in modern times dotted with mine pits, stone quarries, sawmills, and the homes of laborers who worked them.

Ellis set to work with his instruments and in a short time discovered a cause of death which was sufficient but mystifying. The kidneys, lungs, intestines, and livers of both children contained lethal amounts of arsenic. There was quite enough arsenic to account for the death of several adults. There was, on the other hand, no record that either the boy or the girl had taken any known preparation containing arsenic prior to their deaths. The chilling possibility that a person or persons unknown had deliberately slipped poison to the children, concealing it in a sweet, may have crossed Ellis's mind. Since the family was fairly popular and the children well liked in the district, it was more likely that some pharmaceutical error had been made which would turn up on investigation. It would be a routine police assignment to check whether the medicines available in the local chemist's shop contained arsenic and had been given mistakenly to the children.

There was, however, one trouble with each of these lines of inquiry or, indeed, any based on the notion that the victims had taken a killing dose of arsenic. Acute arsenic poisoning is swift and horrifying to watch and is accompanied by vomiting, leg and arm cramps, severe pains in the head and stomach, cold sweat over the entire body, and other symptoms classically described in the final pages of *Madame Bovary*. The children, however, had died after a long period of sickness, with lingering symptoms that had eluded quick or clear-cut diagnosis. They had obviously not taken the arsenic in a massive dose by mouth. There was nothing on which to rest any hypothesis of deliberate or accidental poisoning.

The county analyst of Gloucester mulled over these facts, and an idea occurred to him. Leaving the laboratory, he made his way to the home of the bereaved family. It was an old house, well beaten by the west country weather. Its walls had admitted moisture in several places; on their inner sides Ellis found wallpaper spattered with faded and stained spots where dampness had penetrated. He peeled off strips of the paper and gouged out samples of the plaster underneath it, sending them back to his office for chemical examination. While at the house, he asked permission to examine six other members of the dead brother and sister's family. Puzzled, but convinced that a certain amount of oddity was normally to be expected in government officials, they submitted. What Ellis found sent him off at once to a neighboring home, where he repeated his wallpaper sampling performance and made fresh examinations of the residents. Included in the examination were a retired pastor and his wife, both feeble and "ailing" for some time past.

When the chemical report was submitted, Ellis laid it next to his examination findings and had his suspicions confirmed. All samples of plaster and wallpaper contained arsenic. The amounts were small — four to eight parts per million—but were not insignificant. Four of the six relatives of the dead children had traces of arsenic in their systems; all of the people examined in a nearby home had traces of arsenic, with attendant light symptoms of poisoning; and the pastor and his wife were found to have semi-lethal doses of arsenic. Ellis knew then he had hold of one end of a thread of a medical mystery, which stretched back well over a hundred years. He had run into fresh cases of poisoning by Gosio's gas.

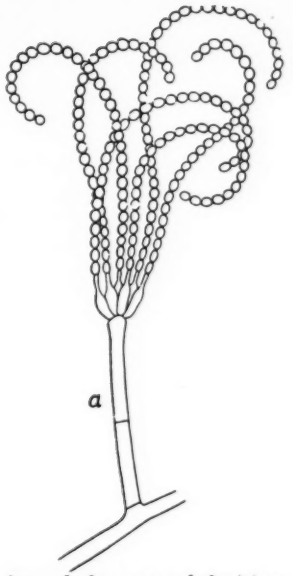
As early as 1815, police authorities in Prussia had been advised of certain unaccountable cases of arsenic poisoning by doctors who had attended the cases. In none of these instances had the usual motives for foul play or violence been discovered. The Prussian officials worked around in circles for some time, before one of them made a basic observation. He noticed that without exception the houses in which deaths had occurred had papered walls. Many of the wallpaper dyes then in use contained arsenic, particularly one called Scheele's green, a popular shade appreciatively named for its discoverer, Karl Wilhelm Scheele. This Swedish chemical wizard had discovered chlorine, tartaric acid, and glycerine, and described the properties of oxygen before Joseph Priestley got around to it. It seemed reasonable to the Prussians that as the wallpaper aged, bits of pigment flaked off allowing minute particles of arsenic to be inhaled by the victims. Resting on this deduction, they wrote *geschlossen* on the case records and turned their attention to other problems.

Unfortunately, this theory was rather quickly destroyed by the appearance of new cases, in which the poisoned individuals had lived in homes where the wallpaper was new. In these cases, clearly there could be no flaking pigment and no free specks of arsenic dust to be inhaled. Matters rested there until 1839. At that time, the problem came closer to solution by a "nose." It was one of the most distinguished "noses" in German science, belonging to Professor Dr. Leopold Gmelin, foremost inorganic chemist of the era and professor of both medicine and chemistry at the University of Heidelberg. Gmelin came from a long line of distinguished scientists, his father being a professor of chemistry and his uncle a naturalist who had explored Siberia. Brought into the new cases as a technical expert, Gmelin caught a clue which had eluded the detectives up to then. In the homes of several of the victims he sniffed a familiar odor of garlic, which could not be traced to any activities going on in the kitchens. He speculated whether the deaths might have been due to the inhalation of a gas, unnoticed by the people who inhaled it because its bouquet was innocuous, or at any rate, familiar. As

many of our soldiers can testify, arsenic-containing gases used as chemical warfare agents have a garlic odor, and Gmelin quickly made the correlations necessary to satisfy the authorities. Other things claimed Gmelin's attention, and he was forced to drop the investigation without following his nose any further. He made one final note, though. The garlic odor was strongest when the paper on the walls was damp, as it often was in buildings whose construction was not all that time and weather demanded.

For another thirty years the problem was shelved. There were somber reminders occasionally; in 1847 one German newspaper reported that an entire family died from "unknown poisonings." In 1848 the Prussian Government, which certainly had other matters on its mind, got around to passing a law limiting the concentration of arsenic in wallpaper dyes. The public was warned from time to time about the dangers it was inviting, but the burghers evidently held hard-headed attitudes about scientific theories that had not been proven. In 1859 most of the middle-class parlors of Berlin were still decorated with paper high in arsenic compounds.

In 1870, some new ground was gained, appropriately enough by an official of the Public Health Service of Dresden, one Herr Professor Dr. Fleck. With bacteriology making giant strides based on the work of Pasteur and Robert Koch, the new bureaucracy had at hand some really workable tools. Refreshing himself with Gmelin's observations concerning dampness, Fleck took strips of paper soaked in arsenic compounds, pasted them inside flasks, and pumped the flasks full of air saturated with water vapor. After a week or so, he noticed splotches of mold on his paper samples, but that was to be expected. Molds grew in damp areas; it did not take a scientist to tell him that. Any *hausfrau* cleaning out an unused closet would testify vigorously to it. Fleck now bubbled the air from his flasks into testing solutions and observed the formation of precipitates which contained arsenic. Somehow the air in the flasks had been contaminated with arsenic, and Gmelin's hunch about a poisonous gas had been correct. Fleck then tackled the next job, that of identifying the gas. He turned loose the



A drawing of the asexual fruiting of one of the *Penicillium* species closely related to *P. brevicauli*. Taken from a paper by Dr. B. O. Dodge, published in "Mycologia".

chemical and technical resources of the Dresden Public Health Service on the problem of determining the composition of the gas which came from his flasks. After several months, it was clear that all the experiments led into a blind alley, and Fleck gave it up as a bad job.

With Dresden's honor humbled, the next contestant to tackle the arsenic cases was an Italian, Bartolome Gosio. Gosio was young, gifted, and versatile, and one of the coming men in chemical analysis. Two of his most important problems was the purification of water supplies (the public health services were rewarding the taxpayers handsomely in leading the fight on the death rate in the marshy areas of Italy) and the chemical and biological identification of arsenic compounds in materials of biological origin. Gosio had the additional advantage in that he was both interested in and trained in the new science of pure culture bacteriology. With occasional cases of unsolved arsenic poisonings as a spur, Gosio pounced on the problem which had eluded Professors Gmelin and Fleck. In contrast to these earlier workers, Gosio did not start with paper. Remembering his training in bacteriology, he turned to a semi-solid nutrient not listed in laboratory manuals and whipped up a batch of mashed potatoes flavored with arsenic. The potatoes were sterilized in flasks, allowed to stand open in rooms in which poisoning victims had lived, and were then stoppered. Within a short time the potatoes were covered with spots of brightly colored molds. Gosio then fell back on the Gmelin principle of trial by nostril; he sniffed his flasks and got an unmistakable whiff of garlic.

Some laboratory mice were rounded up and promptly dropped into the garlicky flasks. Within seconds the mice stiffened convulsively and died. The problem had been pinned down. Arsenic compounds could be converted into a gas which was fatal if inhaled. He had chosen arsenic oxide deliberately for his experiments. It was known that pure arsenic could be changed into arsenic oxide by dampness; it had probably happened in those places where walls and ceilings leaked and the wallpaper had become damp. Something else had worked on the oxide, turning it into the gas which changed a family bedroom into an execution chamber. Gosio tried to identify the gas but could not come up with any definite results. He could produce the gas at will and it came to be called by his name, but he could not break it down. If he could not succeed there, however, he could try for place money. He turned his attention to the mold.

By the end of the nineteenth century molds were known to be living organisms, which lived at the expense of organic material. Uusually composed of thread-like filaments, they decomposed organic material, breaking it up into simpler compounds which could then be taken into the cells of the mold and built up again into protoplasm. There are molds that live in soil, water, bread, leather, and living organisms. Some molds, as a matter of fact, lend tone to our expensive varieties of cheese, and others cause severe diseases of plants and animals. Gosio knew that he must find the one mold out of the hundreds in his flasks, which produced the deadly gas from mashed potatoes and arsenic oxide. It had to be a living organism, because killed molds did not act on his medium. He finally found it. It had an impressive name, *Scopulariopsis brevicaulis*. It is now properly placed in the genus *Penicillium* among the fungi which produce Roquefort and Bleu cheeses, penicillin, and other products of economic importance, and form the blue-green velvet on rotting oranges.

(Continued on page 19)

New Information about an Old Crop -- PEANUTS

Here Is What Scientists Are Doing for Peanuts in Chemurgic Research

By **K. L. Baringer**

PEANUTS rank as one of the important agricultural crops of the world — valuable as a source of oil, food, feed, and forage. World production in 1953 was nearly twelve million tons. Largest producing countries, according to tonnages harvested, are India, China, French West Africa, United States, Nigeria, and Argentina.

An ancient crop, whose origin apparently once was shrouded in mystery, peanuts are now known to be a native of South America. Today they are grown around the world in countries of the tropics and warmer regions of the temperate zone. The plant is said to have been carried to Africa by Portuguese mariners in early periods of trade after the discovery of South America; thence to Europe; later to North America, probably during the time of African slave trading. It is known that the crop was grown in North America during Colonial days.

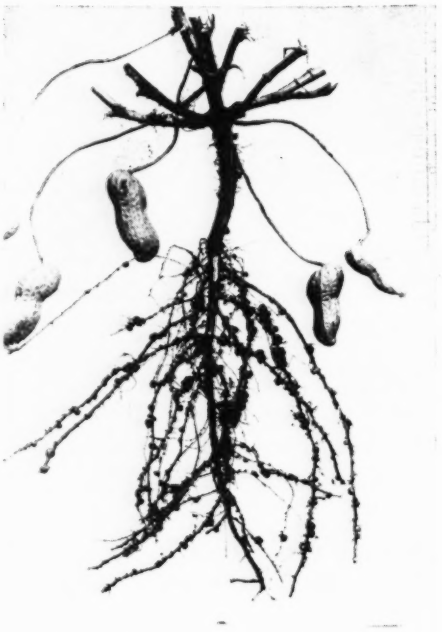
Arachis hypogaea is the name of the peanut cultivated for commerce. The genus *Arachis* is a member of the pea family *(Leguminosae)*.

Judging by the differing descriptions of the plant in the literature, the last word has not been said about the botany of peanuts.

According to a recent study (F. J. Hermann. A Synopsis of the Genus *Arachis*. Agric. Monograph No. 19, U.S.D.A. January 1954) there are eight wild species of *Arachis* besides the cultivated (annual) species.

The central stem of the plant grows erect, but in some varieties branches grow from the center stem in an upright manner, and in others they grow laterally, trailing the ground, as a vine. Thus, peanut varieties are called "bunch" (upright) or runner (prostrate) types.

The peanut is an unusual legume in that it matures its fruit — actually a pod — underground. Small flowers, yellow to orange-colored, form at the joints where the leaves are attached to the stems. As the flower fades, a shoot, or "peg," as it is called, forms, elongates, and pushes into the ground,



Roots of a peanut plant, showing nodules formed by nitrogen-collecting bacteria

where the pod develops. At maturity, the pod contains one to three nuts or kernels.

The peanut's peculiarity in maturing its fruit underground makes harvesting difficult — has retarded complete mechanization in some areas. The whole plants are lifted or plowed out by use of various types of diggers. In the more humid areas, the soil is shaken off and the plants and pod together are stacked by hand around poles about six feet high, with the plants kept from touching the ground by crosspieces nailed to the poles. Since the nuts are still wet, they are left in this position to "cure," usually two to four weeks.

Machines that will "combine" (reap and thrash simultaneously) have been built. Equipment and structures that will dry the picked nuts in a reasonable time have also been devised. The problem is to produce by these mechanized methods peanuts of the flavor, texture, and seed value of peanuts produced by the old-fashioned hand-stacking, when hand-stacking is properly carried out.

The necessity of curing the moist nuts is another difficulty in harvesting, since it introduces a spoilage problem. Present methods of speeding up curing by artificial drying are not considered satisfactory.

The dried vines may be used for hay — they have about the feed value of soybean or cowpea hay.

In some producing areas after the hay is cut, peanuts are "hogged off"— left in the ground as feed for hogs.

Yield of peanuts per acre depends on good cultivation and harvesting practice. In the United States yields average four hundred and sixty pounds (southwestern area); eight hundred pounds (southeastern area); and eighteen hundred pounds (Virginia-Carolina area).

Much has been done through State Experiment Stations and Federal agencies to improve methods of cultivating, harvesting, and handling peanuts, and to develop higher-quality, higher-yielding varieties.

The peanut consists of a hemicellulosic shell, or hull; a thin skin (testa), varying in color from pearl white to mahogany red; the kernel, made up of two cotyledons, with the heart (germ), representing about two percent of it. Each portion differs markedly in chemical composition.

Hulls comprise about twenty to thirty percent of the weight of the mature peanut (depending on variety and environmental conditions).

Skins make up about three percent of the kernel. They are high in fiber and ash and contain appreciable nitrogenous material.

Kernels contain about forty-three to fifty percent oil; twenty-five to thirty percent protein; five to twelve percent carbohydrates; about three percent crude fiber; and two to three percent ash. The only sugar present in appreciable quantities is sucrose, about two to five percent. The germ contains considerable oil and nitrogenous material; ash content is similar to that in the whole kernel.

Peanuts are nutritious. One pound of peanut butter contains more calories, protein, minerals, and vitamins

than a pound of beefsteak. They contain practically no vitamin A or D, but are an excellent source of the B vitamins and vitamin E. Vitamin K is probably also present, as well as small amounts of ascorbic acid.

In processing, when peanuts are to be shelled and used as whole nuts, the skins are usually removed. In peanut butter uses, skins and germs are removed. In milling for oil, the whole seed is processed.

Oil is extracted from the seeds commercially by hydraulic or screw pressing and by prepress solvent extraction. The first operation is the separation of the trash, stones, and dirt from the nuts by machinery. The meats or kernels are then obtained from the nuts by cracking the shells in rolls and separating the shell fragments by screening and aspiration.

Peanut cake, remaining after the removal of the oil from the kernels, is ground to meal and mixed with ground shells to adjust the protein content to forty-five percent, the trading rule value. In the United States this modified meal, amounting to about one hundred thousand tons annually, is available on a limited and local scale as a livestock feed. (Investigators have found in feeding tests that as a source of protein in mixed feeds for beef and dairy cattle, swine, poultry, and some other animals, peanut cake compares favorably with other vegetable proteins.)

An average of about one hundred fifty thousand tons of waste shells, or hulls, are available from peanut milling annually, and attempts are being made by chemists to convert them into useful materials.

In producing countries outside the United States, the main interest is in oil. In the United States an insignificant portion of the crop was processed for oil before 1934. At present, fifteen to twenty percent is extracted for oil and meal. The largest amounts of the United States crop are marketed as food products, principally peanut butter, candy, and salted peanuts. A small percentage is used in bakery products.

In the United States peanuts are produced in every state in the South. At the time of the Civil War, they were being produced extensively for home use in Virginia. Peanuts attracted the taste of soldiers fighting in the region, and when they scattered later to their homes, they carried seed with them. Planting of the crop then spread throughout the South.

Principal region of cultivation at present is the Southeast, comprising Georgia, Florida, Alabama, and Mississippi. Another group is comprised of Virginia, North Carolina, and Tennessee. A third area is the Southwest, including Arkansas, Louisiana, Oklahoma, and Texas. Principal varieties of peanuts grown in the United States are 'Runner,' 'Spanish,' and 'Virginia.'

Some early statistics show how U. S. peanut production has increased through the years. In 1863 the U. S. produced about ten thousand tons of peanuts. During the 1920's production averaged three hundred and ninety-five thousand tons annually, with a farm value of about $39,000,000. During the 1930's and again during World War II, production increased sharply. Production of eight hundred thousand tons in 1953 has an estimated raw material value of about $160,000,000.

This increasing production of peanuts in the United States has led to a surplus of the crop. When agricultural crops are in surplus, utilization research is called for—either to improve and extend present uses or to create altogether new uses and markets.

With this belief, the U. S. Department of Agriculture has conducted utilization research on peanuts since 1941 through its Southern Regional Research Laboratory, New Orleans. This laboratory is one of four regional research laboratories authorized by Congress in 1938 to search for new and extended chemical, technological, and scientific uses for farm crops. It is part of the Southern Utilization Research Branch, Agricultural Research Service.

A "runner" type of peanut plant—notice how the peanut pods are attached along the stems for the "runner"

The aim of the Southern Utilization Research Branch is to increase the uses of crops grown in the southern United States and in Puerto Rico. Besides peanuts, commodities assigned to SURB are cotton, cottonseed, sweetpotatoes, sugarcane, citrus fruits, southern vegetables, rice, and some minor southern oilseeds.

Goal of SURB research on peanuts is to accumulate information on the nature and behavior — composition, properties, and reactions — of the peanut and its constituents, and to apply this information to develop new or improved products and new or improved techniques and processes, or to solve specific problems of farmers and processors.

In 1940, on the eve of opening of the Southern Regional Research Laboratory, benefit payments of one type or another were being paid to divert peanuts from edible channels to oil mills for crushing. Seventy-five to ninety percent of factory consumption of peanut oil was going into shortening and oleomargarine, and all meal was fed to livestock. These restricted outlets for oil and meal were due, in part, to the lack of adequate knowledge concerning chemical and physical properties of these peanut components or to lack of processing facilities to adapt them to other uses.

In the more than a decade of research since then, the Southern Regional Research Laboratory has amassed a wealth of basic scientific data on the peanut itself and on its derived products — oil, meal, and protein.

Initially, the Southern Laboratory's program was concerned with determining the properties of oil, meal, and protein, because little information was available about them. Later, research was undertaken on the chemistry and technology involved in processes of peanut butter manufacture.

These programs were rounded out

This is the Southern Regional Research Laboratory, U.S.D.A. Southern Utilization research branch where utilization research on southern farm crops is conducted. It is U-shaped, with a floor area of about four acres.

in 1953. They have yielded much systematic information on the processes and products of the industry that is potentially applicable by industry and agriculture. Because of this research, quite a few of the gaps in knowledge in peanut chemistry and technology have been filled in, and the foundation has been laid for the future development of wider outlets for peanuts.

A few of the investigations whose completion closes out this first period of utilization research at the Southern Regional Research Laboratory are reviewed here.

Moisture in kernels is important in trading as a means of determining storageability and processing characteristics. Investigation by SURB scientists of methods of determining moisture in peanut kernels provided the basis for adoption by the American Oil Chemists' Society of an official method for determination of moisture as well as for the trading rules of the National Cottonseed Products Association for peanuts.

It is because of an investigation by SURB scientists that peanuts are now traded for oil milling on the basis of U. S. grades. They carried out analyses of kernels of 'Spanish,' 'Runner,' and 'Virginia' types. It was indicated that all peanuts of U. S. No. 1, No. 2, and No. 3 farmers' stock grades, grown under similar environmental conditions, yield oil and nitrogen at almost the same rate in proportion to the total percentage of kernels after shelling; and that the oil obtained from various lots of such peanuts is about the same quality from a refining standpoint.

Conditions of storage are important from the standpoint of moisture content, changes in chemical composition, and changes in the extracted oil and meal. A substantial amount of damage is done to the crop either before use in the whole state or before processing into oil and meal. If conditions of curing and storage are unfavorable, the material produces heat; the result is loss of quality and viability. An index of deterioration was established through determination by SURB workers of temperatures and periods of safe storage of peanuts.

Studies of peanut oil have included work to improve its stability. Peanut oil that has been refined and hydrogenated (solidified) keeps fairly well, but like other oils of its class eventually undergoes oxidative rancidification.

Vegetable oils contain substances that protect them for a long time against becoming rancid; the tocopherols are among these. Besides acting as antioxidants, tocopherols have vitamin E activity. Tocopherols of peanut oil have been isolated and investigated in research at SURB. They have been compared with synthetic vitamin E. Products which otherwise do not have good keeping qualities can be kept fresh longer when either the tocopherols or synthetic vitamin E is added.

Peanut oil products (including cooking oils, shortenings, margarines, and stabilizers for peanut butter) are usually processed at high temperatures. The products are chilled to impart desirable physical characteristics. The degree of heat that must be supplied or removed to produce a desired change in temperature must be known for the efficient design and operation of processing equipment. Measurements of the heat properties of peanut oil have been completed by SURB scientists, so that it is now possible to calculate by means of simple equations the amount of heat involved either to raise or lower the temperature of peanut oil.

An understanding of many other physical and chemical properties of peanut oil is necessary to adapt peanut oil to various processes. Also investigated have been dilatometric and plastic properties, and solubility in various organic solvents. Practically nothing was known concerning these properties before they were determined by workers of SURB.

One interesting "tailor-made" oil that SURB workers have developed is a substitute for olive oil, especially for use as a lubricant in the textile industry. This product was developed as part of research during World War II, when it was of interest to develop substitutes for imported materials. Although in a comparative test the composition of a commercial, completely refined peanut oil did not resemble that of a commercial brand of imported olive oil, the peanut oil could be modified to form a product chemically similar to olive oil, and for certain purposes it could replace olive oil without modification.

Although excellent peanut butter is manufactured and marketed in this country, processors need answers to many questions, particularly about evaluation of the products. SURB research has produced information that enables certain procedures to be improved or to be based on scientific rather than on empirical information.

Variables of peanut butter processing have been systematically investigated to provide information regarding their effects on the properties of the finished product, before and after storage. For example, the effects of temperature of roasting peanuts on the manufacture and quality of peanut butter were investigated. Factors studied included moisture and oil content of peanuts at all stages in the processing, ratio of soluble nitrogen to total nitrogen content, thiamin content before and after processing, and the free fatty acid content of oils extracted from the various products at intermediate processing steps as well as in the resulting peanut butter.

Methods of peanut oil extraction have also been studied by SURB — especially, solvent-extraction. SURB has developed processes of direct solvent extraction of peanuts that produce almost oil-free meal and give a higher yield of oil than is possible with hydraulic and screw-press processes. But commercial solvent extraction of peanuts in the United States is so far confined, it is believed, to the use of the prepress solvent-extraction method; direct solvent extraction is not now being used, so far as is known. However, many data obtained in SURB research, dealing with problems in material preparation and extraction, are pertinent and are being used with prepress solvent extraction methods.

Although used now primarily in food and feed uses, peanuts offer a potential source of chemical raw materials.

Peanut meal and protein have been the subject of extensive studies aimed at improving their quality as raw materials for new industrial products. The high-quality meal obtained by SURB's way of applying solvent extraction to peanuts contains protein which is adaptable for use in several commercial products. Normally, the red skins of the peanuts remain in the meal, imparting color, curtailing the use of the meal and protein in certain industrial products. SURB scientists have attacked the problem of removing the objectionable color and have developed two satisfactory methods.

One use which Southern Laboratory scientists have found for high-quality protein obtained from solvent-extracted peanut meal is in the development of a new fiber. It is soft and glossy, as warm as wool, and as strong as other fibers manufactured from protein. This is believed to be the first successful attempt in the United States to produce a synthetic fiber from peanuts.

Peanut protein has been used as a starting material in several adhesives products also. It has proved superior to other proteins as an adhesive in paper-coating mixtures. Peanut protein adhesives are suitable in the manufacture of gummed tape and are strong enough for gluing paper and cardboard.

When economics permit peanut protein to be produced commercially, it will be possible, with little additional research, to consider seriously making some of these products. Production of peanuts for nonfood uses could be made economically feasible by reducing the cost of production, by increasing the value of peanut oil and meal, or possibly by combining the two factors, or in another way.

In addition to the work on industrial utilization of peanut protein, research at SURB has contributed to information about the nutritive value of peanut protein. Purified proteins and meals of known processing history have been furnished to nutrition investigators who have compared peanuts to other sources of protein.

Realizing that research on peanuts by SURB had reached a turning point, the Southern Regional Research Laboratory held a conference in February 1953, attended by representatives of various branches of the peanut industry and by researchers of other Federal and State agencies. The purpose was to review results and to obtain indications from these groups of possible future work that would be of the greatest value. Participants in the Conference made clear that quality of peanuts is one of the most important factors involving its utilization. If means can be developed to produce at the lowest possible cost peanuts of uniform and high quality, then markets can be improved. Those aspects of the quality of peanuts that affect its utilization are, therefore, being studied by SURB. The studies include investigations of the effect of various factors involved in the handling and processing of peanuts on their quality. This approach will be integrated with research in other agencies working on other aspects of peanuts.

Ninety-two publications by forty-three members of SURB reporting their research on peanuts have been abstracted in a bibliography, designated AIC-369, issued by the USDA, March 1954. Copies of the bibliography are available without charge, from the Southern Regional Research Laboratory, 2100 Robert E. Lee Boulevard, New Orleans, La.

These researchers are sorting split, blanched peanuts to obtain appropriate samples for analyses

Daylilies of Today

By **A. B. Stout**

This article, written by Dr. Stout for "Flower Grower," July 1951, is reprinted in these pages with permission of the publisher of that magazine. In the intervening three years, the number of named daylilies is estimated to have increased to almost five thousand. —The Editor.

THERE are today about thirty-five hundred named daylilies or hemerocallis. Forty years ago there were only about a dozen — including both species and hybrids — that were widely known in American gardens. Twenty years later, in 1930, there were about fifteen species and approximately one hundred seventy-five hybrids. During the years 1930-1940, the number of hybrids was a little more than doubled, reaching a total of about four hundred. It was between 1940 and 1950, then, that most of the daylilies of today made their appearance. Actually, during this period the number of daylily introductions totaled about three thousand — an average of *almost one a day!*

Three main factors contributed to the recent and sudden increase in the popularity of the hemerocallis as a garden plant as indicated by the rapid rise in the number of named hybrid varieties.

In the first place, early in the century there were the introductions from their native home in the Orient of several new and distinctly different types, or species, of hemerocallis that greatly extended the diversity of this numerically small genus. This, of course, multiplied the possibilities of hybridization.

Secondly, The New York Botanical Garden in 1912 began an extensive program of daylily collecting, breeding, and selecting which, in due course, aroused keen interest among gardeners and nurserymen. In Japan and China, daylilies had received rather scant attention as garden subjects, except perhaps for the double-flowered Kwanso and flore pleno. In Europe and America prior to 1925, there were only limited and incidental hybridizations that gave a few, but worthwhile, first-generation hybrids.

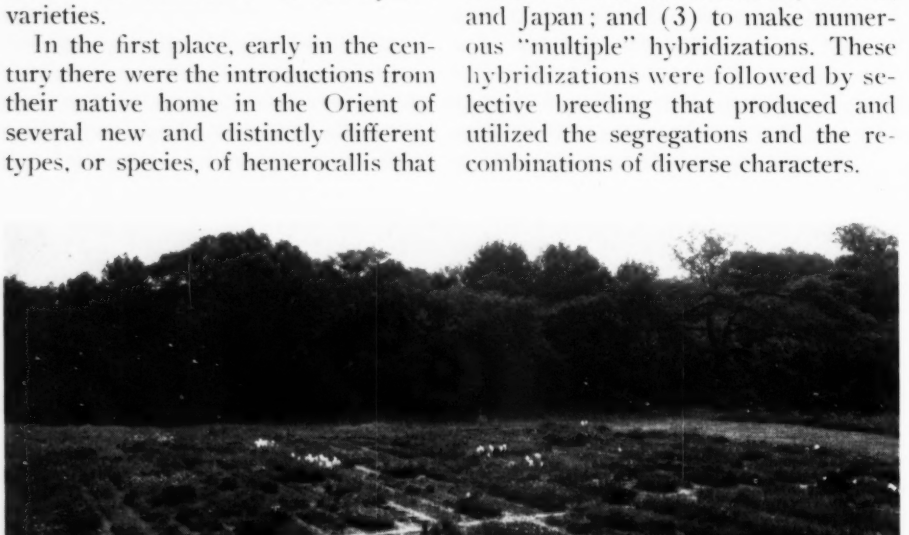
In 1912, The New York Botanical Garden began to work with daylilies on a really serious and systematic scale. Specifically, the Garden inaugurated a three-point program: (1) to assemble plants of all available hemerocallis species and horticultural clones (that is, hybrid "varieties" the stock of which has been built up by vegetative propagation); (2) to obtain wild plants of daylilies and their seeds from China, Manchuria, Siberia, and Japan; and (3) to make numerous "multiple" hybridizations. These hybridizations were followed by selective breeding that produced and utilized the segregations and the recombinations of diverse characters.

This orange-red daylily, with a mahogany mid-zone—one of fifty-nine hybrid daylilies produced by Dr. A. B. Stout—was named 'The Fiftieth Anniversary Daylily' commemorating the fiftieth anniversary of The New York Botanical Garden in 1945

By 1925, these efforts had demonstrated conclusively that new horticultural types and classes — especially in regard to flower colors and patterns — could thus be developed. By 1935, the Garden's large display garden and an experimental planting of more than ten thousand seedlings were being inspected annually by numerous gardeners and nurserymen. Also, by this time twenty-three selections had been named and made available. These included 'Mikado,' 'Wau-Bun,' 'Bijou,' 'Theron,' 'Dauntless,' 'Majestic,' 'Patricia,' 'Rajah' and 'Chengtu.'

Additionally, there were numerous distributions of the new late-flowering and small-flowered *H. multiflora* and of the rosy pink-flowered *H. fulva rosea*. Between 1920 and 1936, too, at least five thousand of the best seedlings out of some fifty thousand discards were distributed to members of The New York Botanical Garden and various of these, as well as the named clones, were acquired by gardeners and nurserymen who subsequently became breeders. By 1935, over twenty amateur and commercial growers were raising at least some seedlings of hemerocallis, and several had introduced clones of their own seedlings.

The third main factor in the rapid rise in the popularity of hemerocallis is what might be called the "golden age" of daylily breeding, which began around 1935. The number of breeders



The daylily experimental garden of The New York Botanical Garden in 1938, with its more than ten thousand seedlings, was inspected by many gardeners and nurserymen

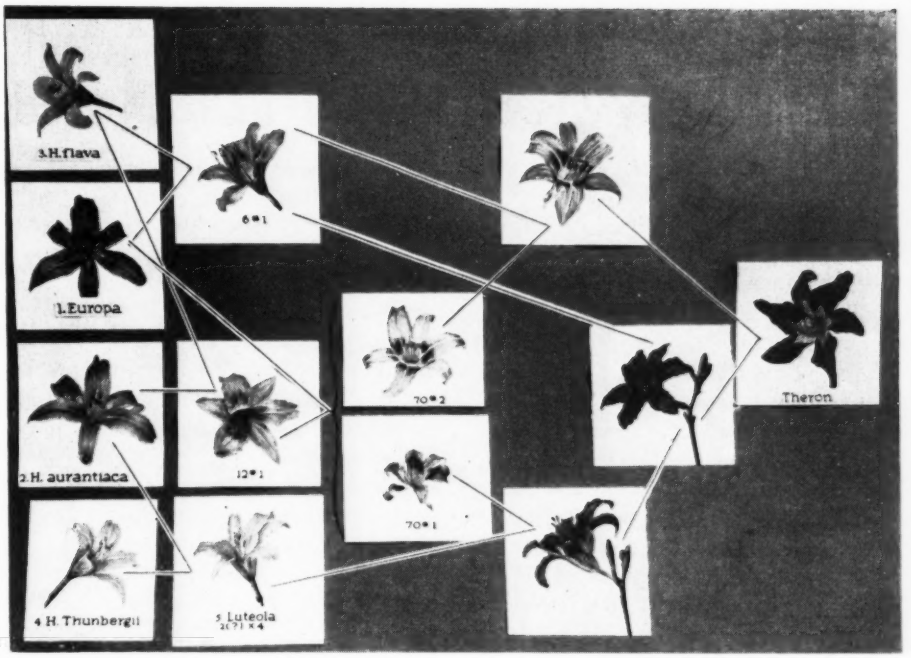
increased, many of them became nurserymen, and there also arose a class of enthusiastic hobbyists who found time and means to make extensive collections of clones and to use these in cross-breeding. It has been stated that some of these hobbyists are now growing as many as twenty-five thousand seedlings at a time, and some of the professional nurserymen have grown still larger numbers of seedlings. Nearly every section of the United States now has one or more daylily specialists or enthusiasts, and in some sections there are sizable groups of them.

The widespread testing now going on can be expected to determine what daylilies are best suited for the widely different climatic areas of the United States, and at the same time the growing of numerous seedlings will extend the possibilities of recombinations and of mutations in the development of new classes.

The few older daylilies have foliage that becomes dormant in winter, and these types have always been rated among the most dependable of garden plants for the temperate zone. More recently, however, the use in breeding work of evergreen types, originating from *H. aurantiaca* and so-called *H. aurantiaca major*, has produced many clones with evergreen habit of growth that are especially desirable in southern gardens. A goodly number of the evergreen and semi-evergreen clones are also reasonably hardy in northern gardens, and there can be no doubt that the development of the evergreen class has contributed much to the horticultural value of the daylily.

It can be said, further, that the range of dormant, evergreen, and intermediate habits of vegetative growth is now such that it is possible to grow collections of excellent daylily clones in gardens throughout the entire United States.

When planning to make a collection of daylilies, a gardener should recognize that there are distinct classes of these plants. In stature, there are dwarf, semi-dwarf, robust, and giant classes that range from one foot to as much as eight feet tall. As regards flowering season, selections may be made which give a succession of bloom from spring until autumn in the North and over an even longer period in the South.



The above chart illustrates the pedigree of 'Theron,' first of the mahogany-red daylilies; it took twenty-five years of painstaking work to get this color combination

Daylily 'Theron,' first described in 1904 in Gardener's Chronicle (English)

It is in flower colors and in patterns of coloring, however, that multiple hybridizations have resulted in the greatest and most conspicuous diversity. Today there is every range of spectrum values for the yellow and orange colorings, which are due to plastid pigments and to quantitative proportions of each, while the sap pigments now provide a wide range of spectrum red colorings as well as a reduction to pale pastel shades of pink and an intensification to mahogany-red with almost every intermediate shade and tone. Also the blending and co-pigmentation of degrees of red with the degrees of orange and yellow give an almost endless variation, except for a pure white and a true blue.

In addition, there is a wide range of patterns in which from two to at least four distinct colors are arranged in eyed, banded, bicolored, and striped combinations. There are also striking diversities in size and form of flowers, in the time of day when the flowers first open, and in the length of time the flowers persist. The flowers of some day-blooming clones close about sunset, while others have flowers that remain in good condition after dark.

The adaptability of daylilies to various garden conditions, coupled with their long flowering season and their great diversity of color and plant size, ranks them among the most dependable and useful of all garden plants. Indeed, it would be difficult to conceive of any size or kind of garden in which daylilies could not be used to excellent advantage. Their garden needs are no different from those of most other popular perennial plants; they require no special cultural techniques, fertilizers, or pest control measures; and, in fact, they will flourish under soil, moisture, and sunlight conditions that will doom many of the less sturdily constituted but popular classes of plants.

A gardener unfamiliar with daylily varieties, but wishing to grow some

(Continued on page 26)

These Plants Make
ATTRACTIVE HEDGES and SCREENS

By **Dorothy Ebel Hansell**

Do you want a hedge to serve as a windbreak, to screen an unsightly scene, to furnish privacy for the terrace or garden, to frame the rose garden or perennial border, to define the boundary of the property with a protective barrier? Do you want a tall or low hedge? Do you want to clip it closely into formal lines or allow it to grow more or less naturally with minimum trimming? For whatever purpose you may desire a hedge, for whatever appearance you may desire it to present, you have many excellent plants from which to make a selection.

Doubtless, the most universally employed plants for hedges are privets and barberries. They grow easily, are not fussy about soil or location (though barberries are happiest in sun and dry soil), are readily obtainable and relatively inexpensive, since most nurseries stock them. The Amur River privet *(Ligustrum amurense)* is more dependable than the California privet *(L. ovalifolium)*, which gained considerable popularity for a while because of its glossy foliage, rapid growth, and ease with which it could be sheared. But the California privet is not reliably hardy and does winter kill to the ground in low temperatures. The Amur River privet, on the other hand, is entirely hardy, grows quickly and erectly, and stands any amount of trimming or shearing. The ibolium privet, a cross between *L. Ibota (L. obtusifolium)* and *L. ovalifolium,* has the same degree of hardiness of *Ibota* and the bright green leaves and dense growth habit of *ovalifolium*. Thus, it is better hedge material than the California privet, though not sufficiently hardy to use in extremely cold climates. For a low hedge, informal, and requiring pruning only once a year, the Regels privet (commonly known as *L. Ibota* var. *Regelianum* but correctly *L. obtusifolium* var. *Regelianum)* is a good choice. This privet is hardy and develops into a thick hedge with foliage right to the ground. The leaves assume a purplish tint in the fall, and the blue-black fruits persist well into winter.

Everyone is as familiar with the Japanese barberry *(Berberis Thunbergii)* as he is with the common privet. It has become a very popular hedge plant by reason of its hardiness, the brilliant autumn color of its foliage, and its scarlet berries which hang on the dark brown branches throughout the winter. There are barberries less well known, which deserve consideration. *B. Thunbergii atropurpurea* has foliage variously reported to be "bronzy red" or "purplish red"—perhaps the latter is a more accurate description. The variety *pluriflora* has leaves which turn brilliant scarlet in the fall and very bright red berries. The foliage on the form 'Truehedge' fills in quickly, after the plant has become established, right to the ground. Because of its pyramidal habit it can be used as a formal hedge with minimum clipping. *B. Thunbergii minor* or box barberry is a true dwarf—a promising plant where a low, slow-growing hedge is needed.

One of the most satisfactory of the barberries for a hedge is the low Mentor barberry. Its compact growth requires little pruning—in fact, minimum trimming keeps it in good shape. Its foliage carries its rich green color well into winter; its fruits are a dull, deep red and persistent; and its sharp thorns offer a protective barrier. *B. Julianae,* one of the parents of the Mentor barberry, is also fine hedge material. It has the distinction of having small, evergreen, holly-like leaves, yellow flowers and purple fruits. *B. verruculosus* can also be used for a low hedge —protective, too, for it has many spines. *B. verruculosus* and *B. Julianae* are not stocked by all nurseries; you may have to look for them, and you may expect to find them more expensive than some of the other barberries.

For a beautiful evergreen hedge, the Canadian hemlock is unsurpassed. It lends itself admirably to formal treatment, for it does not object to being severely pruned and can be restricted in height from six to ten feet and in width from five feet or more, as desired. (It must always be pruned so the hedge is wider at the base than at the top.) However, some of its distinctive beauty —the feathery effect of its gracefully pendulous branches—is lost by severe shearing. So if you have the space to allow the Canadian hemlock to grow more naturally—trimming rather than shearing it closely—by all means do so. It tolerates shade but cannot endure salt water and does need to be watered frequently in prolonged dry spells.

The merits of the upright Japanese yew *(Taxus cuspidata capitata)* have long been recognized. Crossed with the European *T. baccata,* it gave rise to *T. media* and named horticultural varieties, all excellent as evergreen hedge plants. They remain shapely with a little trimming or can be pruned more severely into formal lines. They endure trying weather conditions and exposures—even do well facing due north. They are not fussy about soil, though they appreciate occasional topdressings of leafmold, and withstand such adverse conditions as the dust and smoke and stuffy air of cities. Yews have a sturdy, deep green appearance all year —and the light green of new growth is a refreshing contrast.

Several spruces are satisfactory for screens and windbreaks. The Norway spruce *(Picea Abies)* is widely used for such purposes, for it grows rapidly and, with its rich evergreen foliage, soon develops into a handsome screen or windbreak. The dragon spruce *(Picea asperata),* introduced from China around 1910, is very hardy and not only tolerant of wind but of seashore conditions. You will have to look for this spruce, for even though it is well recommended as a splendid plant for a tall hedge or windbreak, not many nurseries list it. And, of course, it is more expensive.

The Austrian pine *(Pinus nigra)* makes a very stalwart windbreak for shore property; it can be planted on the ocean front for salt water does not seem to harm it. The white pine *(P. Strobus)* also makes a satisfactory and attractive hedge, because it branches near the ground and because its leaves,

or needles, are of such a pleasing soft pale green. The leaves of some forms have a bluish tone. The white pine responds well to pruning; and if pruning is started when the plants are young, growth will be dense and from the base up. The Swiss Stone pine *(Pinus Cembra)* has been used in northern climates as a hedge for, being a native of the alpine mountains, it endures really cold weather. Its branches—the lower ones practically touch the ground—are clothed with needles in an attractive shade of green.

The American arbor-vitae *(Thuja occidentalis)* has few equals as a windbreak or as a medium to tall hedge in difficult situations. It thrives in a variety of soils and is very hardy; it does reasonably well in shade, though it prefers a sunny, moist location. It can be pruned to a moderate height or allowed to grow taller, as desired. It responds to clipping, so can be trained for formal effects. Its moderate rate of growth and its habit of growth—it is bushy at the base and tapers at the top—reduce the amount of pruning necessary to keep the hedge in good shape. Arbor-vitae does have one fault in the eyes of some people — its lacy dark green leaves have a tendency to burn brown in winter. Several forms of *Thuja occidentalis* are sold, and as there is variance in the color of their foliage, it is advisable to make your selection at the nursery.

In sections where winters are mild, box makes an ideal hedge, furnishing almost complete privacy to the garden it encloses. This dense screening is due to its growth habit—its small leaves are closely packed on the branches which break upward from the base. North of the Mason-Dixon line, box must be carefully protected in winter; otherwise, you run the risk of having it winter killed to the ground. And there seems little common sense in selecting a plant for an evergreen hedge, if you must cover it with a frame of wood and burlap during that period of the year when its green color would be most appreciated. *Buxus sempervirens suffruticosa* is hardy as far north as New York City and is used to edge paths and gardens. The Japanese box *(Buxus microphylla japonica)*, reliably hardy through New York state, makes an attractive hedge.

If you prefer a hedge with spring or summer bloom, or autumn color of leaves and berries, why not give thought to the viburnums? They comprise one of the most valuable groups of shrubs for American gardens. Their distribution is wide—from north to south, from high altitude to sea level, from woodland to meadow, from swamp to well-drained land. Both the Japanese *V. tomentosum* and its sterile form 'Snowball' are effective hedge material, for with moderate pruning you can restrain their height and width.

The American cranberrybush *(V. americanum)*, one of the hardiest members of the genus, makes a splendid hedge or screen attractive over a long season because of its clean foliage, white flowers, and bright red berries which remain the greater part of winter. *V. dilatatum* with red fruits and *V. Sieboldii* with pinkish red fruits, later turning blue-black, are good plants to frame an outdoor living room of natural, not formal design, or to mark the property line. The native *V. dentatum* can be similarly used or can be sheared into a hedge; and the native *V. Lantana* is one of the best hedges for a shady situation. Still another native viburnum, *V. cassinoides*, is a useful hedge plant and can be restrained to a height of three to four feet by judicious root as well as top pruning. Where temperatures do not drop below 10°, the Chinese *V. rhytidophyllum* makes a striking hedge, well furnished with dark green leaves and requiring only a little clipping to keep it trim and shapely. While *V. rhytidophyllum* is evergreen in mild localities, it does not retain its foliage all year in the north. The leaves do stay on the bush, however, well into winter and the red fruits are attractive.

Flowering crabs and hawthorns may be trained as espaliers and as such make very stunning hedges. The cockspur thorn *(Crataegus Crus-galli)* can be trained and pruned into a tall-growing hedge; and it is so thorny that it will deter any child or animal from encroaching on your property. Where winters are mild the English hawthorn *(C. Oxyacantha)* is another good hedge plant. The Russian olive *(Elaegnus angustifolia)* also can be grown as a thick, impassable hedge in mild climates; the grey-green foliage and shreddy brown bark are distinguishing

(Continued on page 26)

OUR COVER ILLUSTRATION

The massive volume called *Hortus Eystettensis*, from which the illustration of *Helleborus* on the front cover of this number of The Garden Journal has been selected, is one of the largest of all botanical books. It measures twenty-two by eighteen inches and is four and one-half inches thick—hardly a handy guide to a garden. Its title, freely translated, runs: "Garden of Eichstätt, or a diligent and accurate delineation from life of all the plants, flowers, and tribes collected in various parts of the world which may be seen in the celebrated gardens surrounding the episcopal mount [of St. Wilibald]." It was published in 1613. There are in the old parchment binding of our copy three hundred and sixty-three folio sheets, of which three hundred and fifty-five bear fine copperplate engravings of plants, each labeled with a name in Latin; about one thousand kinds are shown. At least one copy has been seen with the engravings colored by the celebrated Magdalena Fürst. Descriptions appear on the backs of five scattered plates, like samples of the complete catalogue which one would expect to find.

Prince-Bishop Johann Konrad von Gemmingen laid out in 1609 what is said to be the fourth Botanical Garden in Germany, using in part plants from the celebrated garden in Nürnberg of Joachim Camerarius, who died in 1598. The *Hortus* produced under his direction was certainly the most sumptuous work of its kind that had been produced up to that time. Unfortunately, both author and artist are unknown. Basilius Besler, physician and apothecary, citizen of Nürnberg, "addicted to botany and medicine," appears on the title-page as author. But it is known that his brother Hieronymus wrote the preface, for Basilius knew no Latin. And the naming of the plants has been attributed to Ludwig Jungermann of nearby Altdorf. The engraved title-page is signed by Wolfgang Kilian of Augsburg; but it is unlikely that he was responsible for the rest, which are unsigned.

Whoever made the figures was a skilled artist and a close observer of nature; there is nothing crude or medieval about these plates—many a modern work could be proud of them. The book is more interesting to the bibliographer than to the botanist and perhaps more useful to the horticultural historian than to either; it gives a very vivid and doubtless accurate impression of what was grown in European gardens in the seventeenth century.—H. W. Rickett.

Deciduous and Evergreen Trees for the Future

Part II — EVERGREENS

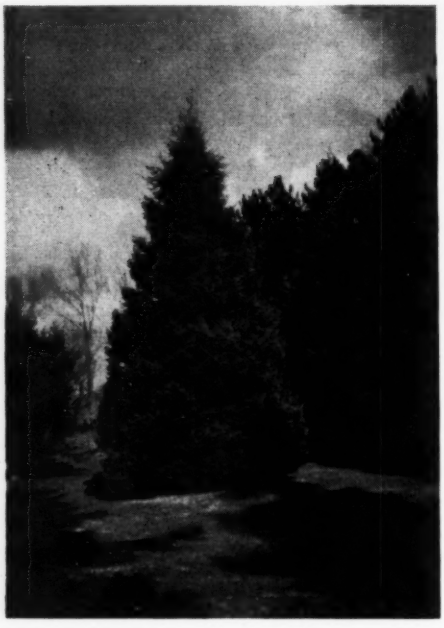
By **Jake Gerling**

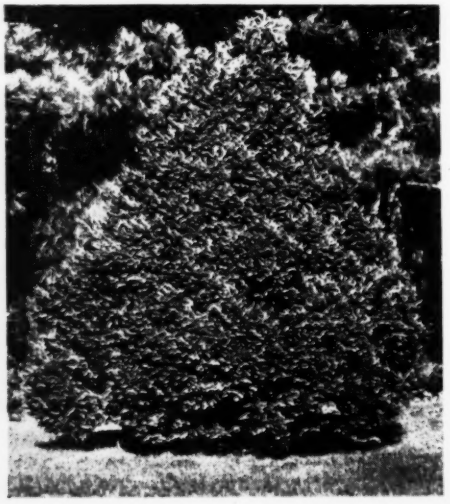
In many areas white pines have become badly infested with borers and scale attacks and so other large evergreens, less subject to serious insect and other blights, are being sought by planters. While no other evergreen foliage has the fine texture and feathery appearance of our white pines, there are excellent trees, hardy and far less affected by natural enemies, that should be in greater use. Among the firs, quite a few species have proven their worth and usefulness and should be much more generally planted. The Douglas-fir, *Pseudotsuga taxifolia,* is a fine evergreen, and the var. *pendula* is one of the most beautiful large ornamental evergreens to be found anywhere. The form *mucronata pyramidata* is of much more compact structure and of very symmetric contour and has shorter, lighter colored foliage. Quite a bit slower growing than the species, this clone is a really fine ornamental type. Another very good fir that is doing well in the Rochester area is *Abies cephalonica,* the Greek fir. This species has the usual deep green needles of many Eurasian firs and makes a handsome specimen tree. A variety *A. cephalonica Apollinis,* the Apollo fir, is a little more rigid but makes very rapid growth in our parks. *Abies Veitchii, A. homolepis,* and *A. Nordmanniana* are found occasionally, but these excellent, vigorous, and relatively pest-free firs should be more widely known, appreciated, and used. All three have strikingly beautiful foliage and are equally fine trees for use in background or screen plantings or as specimens.

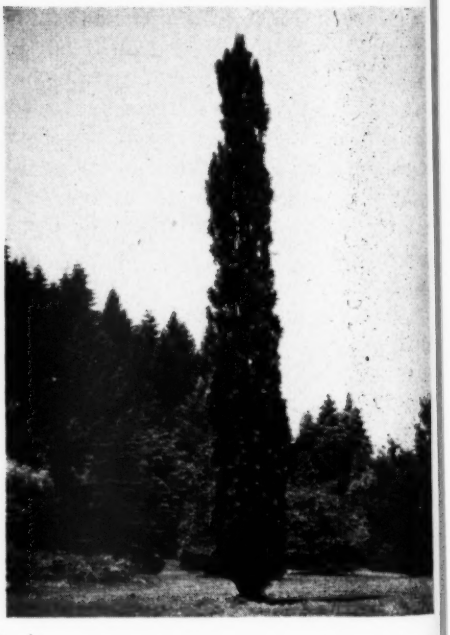
For many years, the blue spruces have perhaps been more frequently planted as dooryard ornamentals than any other evergreen tree. Many of the named varieties do have magnificent color, but the undesirable characteristics and susceptibility to natural enemies too often make these trees a difficult problem in maintenance. While some forms prove far too vigorous and soon monopolize too much space when planted on small home grounds, most spruces seem to lose vigor with age and tend to show but little ability to resist damaging attacks of gall and canker. Few plants are as unsightly as spruce trees disfigured with galls and deteriorated from canker. There is an excellent substitute for spruce, where a blue evergreen is wanted, but this is a tree rarely seen outside botanical plantings —the blue-needled form of the Rocky Mountain fir, *Abies lasiocarpa* var. *arizonica.* This sturdy plant is not as hardy over as great an area as the various forms of spruce, but it does make satisfactory growth in many parts of our zone. Moreover, the fact that the Rocky Mountain fir does not prove a rapid grower in the eastern states makes it a more desirable ornamental where it can be grown and used in limited space plantings.

One spruce is well worth the effort to keep it in good condition because of its extreme beauty. This is the gold-tipped Norway spruce, *Picea Abies* var. *aurescens.* In spring and early summer, the gracefully formed branches of this pyramidal tree are tipped with branchlets of bright yellow. As a specimen group, few evergreens can approach this handsome Norway spruce which is easily grown but for some reason very seldom seen.

Some named varieties of *Pinus nigra,* such as *pyramidalis, austriaca, cebennensis* and *pendula* are splendid large evergreens and among the most hardy. Most forms have long, dark green needles and are very attractive when their branchlets are tipped with the







Above. Dwarf hemlock *(Tsuga canadensis pumila)* is a very desirable little evergreen

Left. *Pseudotsuga mucronata pyramidata* is a small, compact, pyramidal form of the Douglas fir

Right. Fastigiate Scotch pine *(Pinus sylvestris* var. *fastigiata)* is thoroughly hardy and grows easily

new foliage "candles" above the deep buff staminate flowers. A dwarf form, *P. nigra Hornibrookiana,* propagated from a witch's-broom by Mr. Slavin, should help to fill the demand for a hardy, low-growing, long-needled, evergreen ornamental. Plants about twenty-four years old are now three feet high and six feet wide—truly slow-growers that would have a long period of usefulness at wanted size. *P. nigra Hornibrookiana* is not a prostrate, ground-hugging form, but a shrub-like plant with upward-growing branches.

There are many uses for upright evergreen trees and shrubs, and numerous varieties of arbor-vitae and juniper are offered for sale. But it is very difficult to find a satisfactory plant of this type, especially among the smaller forms. For instance, the two fastigiate forms of the so-called red-cedar, *Juniperus communis* var. *hibernica,* the Irish juniper, and var. *suecica,* or Swedish juniper, are both very cranky plants, and it is almost impossible to get them to grow well in many places in the temperate zones. They are all too easily damaged by sun and wind scald, even in relatively mild winter weather, and require far too much coddling for satisfactory practical service. Our choice of an upright type evergreen, for hardihood and ease of culture, must be made from the several fastigiate forms of the Japanese yew, such as *Taxus media Hicksii, T. media Hatfieldii,* etc. A splendid upright type is the Irish yew, *T. baccata fastigiata;* however, this species is not as hardy as *cuspidata* and should be used in less exposed locations.

Very few evergreen species have the hardihood and freedom from enemies as the Scotch pine, which thrives under different growing conditions in many parts of several zones from zone two southward. Having all the desirable characteristics of the parent, the fastigiate form of this species, as grown in Durand-Eastman Park, should be planted where a thoroughly hardy, easily grown, slim, columnar plant is needed for accent or other special purpose. The oldest specimen checked is about thirty-five years old, twenty-two

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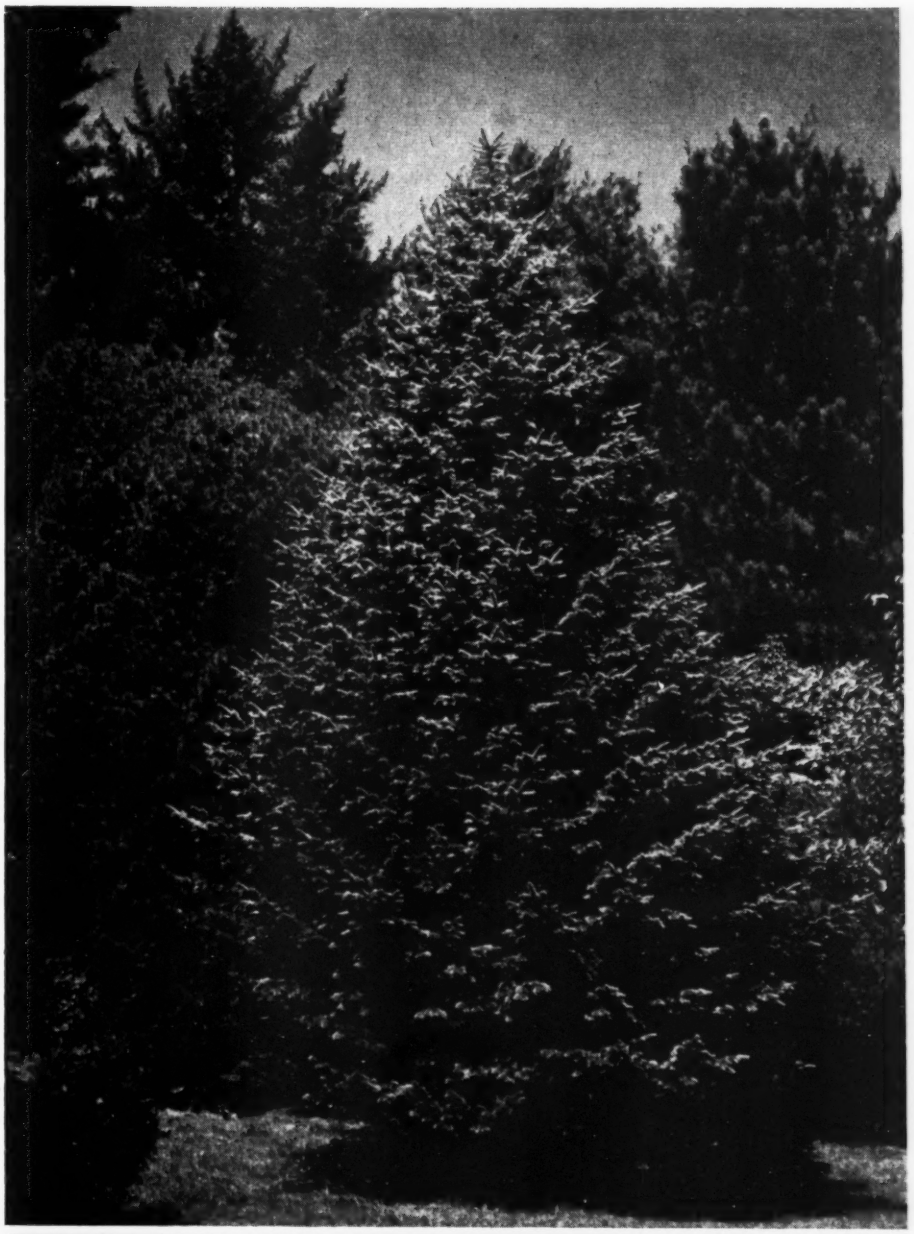


Upper. Blue fir *(Abies lasiocarpa* var. *arizonica)* is rarely seen outside botanical plantings

Lower. This is a good specimen of the dwarf form of black pine *(Pinus nigra Hornibrookiana)*

Labrador tea *(Ledum groenlandicum)*

The Flora of York County, Maine

By Anne E. Perkins

Meadow-beauty *(Rhexia virginica)*

PROFESSOR FERNALD used to say that the flora of York County, Maine, is particularly interesting, because it is a transition zone from the plants of farther south which here reach their northern boundary and the plants of farther north which here reach their southern limit. At one place one is reminded of eastern Massachusetts or even New Jersey, and at another spot he is among the familiar plants of the Canadian forest region.

It might be of interest to note that up to June 1760, when Cumberland and Lincoln Counties were set off, York County included the entire state of Maine.

York County is varied in its terrain. Along the east, it has the sea coast with extensive salt marshes, with some islands and several rivers, Salmon Falls River (being the boundary line of New Hampshire), the Saco, Ossipee, and Little River. There are many small ponds and some large ones, such as Bauneg Beg, part of Province, Mousam, and Little Ossipee. In the northern portion of the county are so-called "mountains." Other areas are sandy with much scrub oak and are known as plains; and there is still much white pine in spite of cutting. "Oak Hill" in Sanford has many oaks—scrub, white, and black chiefly. York County is a great blueberry region, especially around Wells, Berwick, and Lebanon. This diversification lends variety to its flora. Yet there has been insufficient exploration, particularly of Parsonsfield, Waterboro, and Limerick. The Josselyn Botanical Society has done considerable exploring and has held in all seven meetings in York County.

The earliest botanical explorer in Maine as far as we know, was an Englishman, John Josselyn; and because of his early botanical activity, the Botanical Society of Maine was named in his honor, the Josselyn Botanical Society. His brother lived at Black Point, now Scarboro, which is on the border of Cumberland County next to York, and it would seem altogether fitting to claim him as the earliest botanist to work York County. John Josselyn's quaint book on his discoveries is a collector's item.

Perhaps the next botanist who worked York County was Aaron Young (he married a girl brought up by the Shaker Colony in Alfred). Aaron Young collected extensively and made many important discoveries. Unfortunately, a fire wiped out most of his specimens in a Portland museum. His *Flora of Maine* was published in 1848 and then only the first volume.

Among the more recent botanists, Miss Kate Furbish was prominent in exploring York County. She explored northern Maine also, when rivers were the chief means of travel and when Indians were considered dangerous. Her botanical work extended through many years, as she lived to be over ninety. Her large collection of beautiful paintings of flowers is in the library of Bowdoin College.

Arthur H. Norton was an all-around naturalist, not only an exceptional botanist but an ornithologist, interested also in mammals, mollusks, and, indeed, in every phase of natural history. He was largely a self-educated man, an indefatigable worker, a clearing house of information. Mr. Norton probably knew more Maine plants and plant localities than any one now living. I spent many days, even weeks, in the field botanizing with him from York County to Aroostook County. He worked long hours for a mere pittance. He carried on an extensive correspondence, identifying plants sent in, and in this way became familiar with the stations where the rarer plants were found; he told me that botanizing in York County under my guidance was the best. Mr. Norton was Curator of the Museum of the Portland Society of Natural History for many years and for over twelve years president of the Josselyn Botanical Society. His death was a great loss to Maine botany.

Dr. Rodney H. True was a prince of men and of botanists. For over twenty years, he was with the Department of Agriculture and for many years at the head of the Botany Department of the University of Pennsylvania. Dr. True had a summer home in North Berwick and came to call, following which we made many botanical excursions. A keen observer, genial and friendly, he was an ideal companion in the field. His collections are in Philadelphia.

John Crawford Parlin collected extensively in York County during the years he taught in North Berwick, and there discovered the *Antennaria* named

after him. He found many adventives in the yard of the woolen mill and some rare and unusual native plants. His station for *Selaginella apoda* in North Berwick still persists. Mr. Parlin found one shrub of *Lindera Benzoin* in North Berwick over sixty-five years ago; and it was not found again until twenty years ago, when I located a small thicket of it at a swamp in Eliot, a large station in a Wells swamp, and also one shrub at Hollis, near the old Indian Cellar. For years these stations flourished; but after an interval of five years, when I revisited them in 1954, I found they had been practically wiped out, probably by a severe winter. One shrub was found some years ago at the foot of Mt. Agamenticus.

Dr. Fernald did considerable botanizing in the County himself and was much pleased with the plants I sent to him from time to time, especially *Acnida cannabina, Lilaeopsis chinensis, Juncus Torreyi,* and *Aster subulatus* from the South Berwick estuary of the Salmon Falls River. He remarked that York County was full of *Dryopteris simulata,* (Massachusetts fern), considered rare. He had hoped to live to see a book on Maine flora published.

In the "Portland Catalogue of Maine Plants," 1892 and 1895, Prof. Fernald's lists of Maine plants were published by the Portland Society of Natural History. It is interesting to note that some of these are not now known in Maine; also that some plants have come in, many of them bad weeds, as there are more species of *Hieracium,* a great increase in *Leontodon autumnalis,* other species of *Physalis, Berteroa incana, Potentilla recta,* the *Tragopogons, Euphorbia Esula* (formerly known only in North Berwick, now has entered Kittery from New Hampshire and Massachusetts), *Rumex Acetosa* in South Berwick, and *Descurainia Sophia (Sisymbrium Sophia)* in lower South Berwick. *Pycnanthemum flexuosum,* formerly rare, has become widely spread in York County from Gerrish Island to York, Wells, and the Berwicks. Kate Furbish was the first to find it.

In 1895, Dr. Fernald made a list of plants which should no longer be given as occurring in Maine. This stimulated the members of the Josselyn Botanical Society to try to rediscover some of them. Strange to say, *Sassafras albidum,* then called *S. officinale,* was among them, but we must remember that transportation was not easy in those days. As a matter of fact, all my life I have known sassafras, not only as a shrub, but as a tall tree from which stanchions were made for barns in Sanford. It is common on and near Mt. Agamenticus and other sections of York and occurred formerly in Wells on Drake's Island and on Gerrish Island.

Hottonia inflata, another "ghost" plant, was later discovered by Mr. Parlin at a spring on Mt. Agamenticus, but has never since been found. *Pycnanthemum muticum* was listed as "no station known." For many years I had collected it in Berwick and later in Alfred, where a thicket of *Xanthoxylum americanum* occurs on grounds formerly occupied by the Shakers. This later plant is thought to have been originally cultivated by the Shakers among drug-plants as "Tooth-ache Tree." A large patch of *Podophyllum Peltatum* may be explained similarly. However, most of these "ghost" plants have not been found, and at present there is no station for *Anemonella thalictroides,* which occurred during my youth in woods long since cut. The nearest station where I have collected it is Rollinsford, New Hampshire, just across the river boundary from Maine. Nowhere in Maine is known the walking fern, *Camptosorus rhizophyllus,* or *Woodwardia areolata,* both listed in the "Catalogue." It is probably over fifty years since either was found. I have hunted in vain for woodwardia in many towns, especially where it was once reported. With the cutting off of woodlands, many plants have become rare or extinct. The *Woodsia obtusa* station has gone. *Ophioglossum,* however, is very common, if one knows where to look.

Aster subulatus

Chamaecyparis thyoides, long considered very rare, was rediscovered by Dr. True, who did much summer botanizing in York County with Oliver Neal. They found a large grove at Sand Pond, Sanford, and along the Johnson River, though previously known only by one tree in Lyman. Oliver Neal discovered that there were literally thousands of acres, cut and standing, in Berwick and North Berwick and reported it in "Rhodora." He located at Sand Pond the only known Maine station for *Xyris Congdonii,* in a treacherous quicksand bog and collected it on water skiis. He also discovered the only station in Maine for *Ryhnchospora macrostachya*—in York County, by a small pond near Mt. Agamenticus; *Lophotocarpus spongiosus* in a salt marshland in South Berwick and *Hypoxis hirsuta.* A good observer, Oliver Neal profited as I did by close association with Dr. True. Dr. Neal is a professor in Morgantown Agricultural College, West Va.

Dr. Fernald entered *Cornus florida* in the list without comment. It was reported at Fayette Ridge, Maine, not far from Winthrop. Subsequent search by Professor Hyland, while gathering material for his work on the *Woody Plants of Maine,* failed to reveal any

***Habenaria flava*, left; *Habenaria clavellata*, right**

in Maine. Every report proved a mistake—several to be *Viburnum trilobum*. Not until I discovered *C. florida* in 1936, through the chance remark of the fire ranger on Agamenticus, was any authentic station known. Alas! that fire and axe destroy so many stations of choice plants. During the current June (1954) meeting of the Josselyn Botanical Society, Agamenticus was climbed, and Professor Hyland and I searched for the two former stations. We were the only ones who had collected it there, but we found no trace. One station had evidently been destroyed, when the road was built by the government during the last war; on the top, buildings had been erected (some have since been torn down) and much cutting had taken place. There is only a faint hope that *Cornus florida* may still persist. However, specimens and photographs are in several museums. On Agamenticus also occur *Betula lenta, Quercus Prinus, Selaginella rupestris, Krigia virginica,* and at the base *Smilax rotundifolia.*

Unfortunately, when something rare is found, cutting or building or disastrous fires, such as York County has twice experienced within the past few years, seems invariably to exterminate the stations. The large area of *Dryopteris hexagonoptera* (broad beech fern), in Waterboro was destroyed by fire as was most of the area of maidenhair fern. *Platanus occidentalis,* once known in southern Maine, can not be found; the last sycamore I knew was in Wells. The yellow chestnut oak, *Quercus prinoides,* collected in Alfred by Aaron Young, cannot be found; flooding to make Mousam Lake destroyed one section where it grew. The tupelo, *Nyssa sylvatica,* has become less uncommon.

Cimicifuga racemosa, included in the "Catalogue," was evidently an escape, for I have found it twice by roadsides near a garden in North Berwick. *Penstemon pallidus* has spread over a very large area in Eliot, is profuse in North Berwick, scarce in Berwick, South Berwick, and Wells. In the thin soil of parts of Wells and York *Comandra umbellata, Potentilla tridentata,* and *Krigia virginica* are common. *Helianthemum canadense* and *H. Bicknellii,* now uncommon, occur in Berwick and North Berwick. Perhaps because it is lime-loving, the ostrich fern is rare in the County, although it flourishes when transplanted. I know only three stations — Alfred Gore, Saco along the river, and Buxton.

Wells Beach and Drake's Island have interesting plants. *Iris prismatica, Sisyrinchium mucronatum, Ruppia, Carex norvegica, C. vestita,* various maritime sedges and grasses, *Arenaria peploides, Prunus maritima,* from the fruit of which delicious jelly is made, *Polygala cruciata, Hudsonia ericoides* and *H. tomentosa, Glaux maritima, Valeriana officinalis,* and *Achillea lanulosa* occur freely. Drake's Island abounds in *Woodwardia virginica* and *Dryopteris simulata.* Building has destroyed the sassafras. Cutt's Island and Gerrish Island have sassafras, a profusion of *Pycnanthemum flexuosum* and *Datura Tatula.* On Cutt's Island *Polygonum Fowleri* is found.

The Sand Pond region in Sanford, near North Berwick, is of great interest. Here are found such interesting plants as *Chamaecyparis thyoides, Peltandra virginica,* rare in Maine, *Xyris Congdonii* and *X. montana, Habenaria blephariglottis, Sarracenia purpurea, Ilex laevigata,* now common in the County, *Gaylussacia dumosa* var. *Bigeloviana, Decodon verticillatus* and other swamp plants. Botanists have traveled many miles to visit this rich territory.

Bauneg Beg Lake has one of the finest and most extensive stations of *Calla palustris,* also *Isoetes* and various other water plants, notably *Utricularia purpurea* as well as the common one. Water cress reaches huge stature. *Chimaphila umbellata* and *Woodwardia virginica* are common.

In Sanford and York I found *Euphorbia corollata. Gerardia pedicularia* occurs freely in Eliot, North Berwick, and Acton. In York *Rhexia virginica* formerly covered a large area on the edge of Chase's Pond; but this has been mowed and planted, as it is the water supply of York, and the station has been destroyed. On the Eliot border of South Berwick is a good station of *Scheuchzeria palustris. Rhus copallina* I knew only in Sanford, but *Rhus vernix* is altogether too common, notably in Wells in the swamp where *Kalmia latifolia* covers an acre or more. I have also found *Kalmia latifolia* in small stations elsewhere in Wells, Berwick, North Berwick, and York. The large station has been rifled in the past, not only for blossoms but also for the evergreen leaves for decoration. It is now under surveillance for better protection. *Orobancha uniflora,* considered a good find anywhere, is really very common in many parts of York County. So is *Bartonia virginica.*

The large area of *Rhododendron maximum* near Springvale is, fortunately, not easily accessible. The plants are very beautiful and formerly considerable depredation took place; peo-

Pokeberry *(Phytolacca americana)*

ple ruthlessly broke off shrubs and tried to transplant. Gordon Dunthorn, whose kodachromes of wild flowers are so artistic, took pictures of many choice plants in the County without collecting. At that time he had a summer home on Drake's Island, Wells; he now lives at Anacortes, Washington.

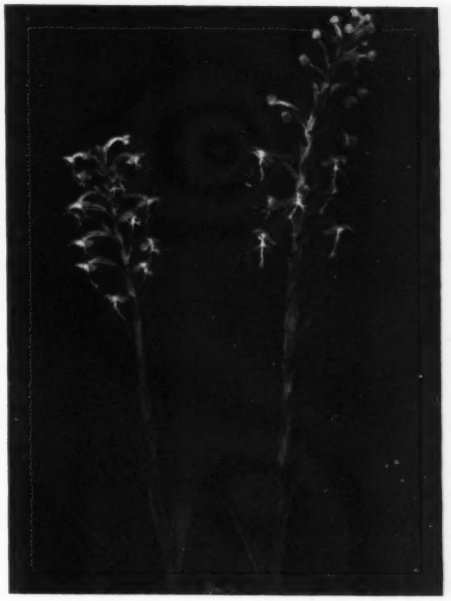
Relatively uncommon in the County are *Trillium erectum, Dirca palustris,* (I have two stations), and *Viburnum trilobum.* The hickory nut is common, but the black walnut and butternut are infrequent. Bald Head Cliff is the only place where I have seen *Juniperus horizontalis* and *Solidago Randii. Lythrum Hyssopifolia* grows here and on Agamenticus. My only station for *Solidago squarrosa* is along the river at Hollis near the old Indian Cellar.

Orchids most common in the County are *Cypripedium acaule,* some albino, *Habenaria blephariglottis, clavellata, dilatata, flava,* and *lacera. Habenaria psycodes* is not common and *H. orbiculata* is rare, as is *Cypripedium Calceolus* var. *parviflorum. Calopogon pulchellus* and *Pogonia ophioglossoides* are common; *Arethusa bulbosa* is rare. *Spiranthes cernua* and *gracilis* are common; but *S. Romanzoffiana* is infrequent. *Goodyera pubescens, repens* var. *ophioides,* and *tessalata* occur occasionally, also *Corallorhiza maculata.*

One good plant I found was *Antennaria Brainerdii* in Berwick. I have found only one station for *Asarum canadense* in South Berwick. Province Lake in Parsonsfield was a good station for *Hemicarpha micrantha,* a rare plant. Of the nearly one hundred sedges, the best were *Carex norvegica, Juncus Torreyi,* and *Scirpus lineatus.* Good grasses found are *Andropogon Gerardi, Aristida dichotoma, Arrhenatherum elatius, Bromus Kalmii, Eleusine indica, Eragrostis pectinacea, Holcus lanatus, Sphenopholis obtusata* and *pallens,* and *Sorghastrum nutans.*

Quercus coccinea has become so rare as to be almost extinct. Recorded as scarce at a meeting of the Josselyn Botanical Society in Wells in 1916, it was searched for, pending the publication of the *Woody Plants of Maine.* I had found it in North Berwick at Parlin's old station, but those woods had been cut. Mr. Norton searched with me, until he located it in Wells and also in North Berwick. Unfortunately, both these stations were destroyed by cutting in widening the road. Road building also took several stations of *Genista tinctoria. Baptisia tinctoria* is not uncommon locally in and near Alfred, where it was found during the 1935 Josselyn Botanical Society field meeting as was *Conopholis americana* in Shapleigh. In Alfred, *Asclepias exaltata* is not uncommon. *Prunus susquehanae* is abundant in Acton and Newfield. *Scutellaria parvula* grew in sight of my home, and Mr. Parlin found it in North Berwick, but no station is now known for it. Huge masses of *Calopogon* and *Pogonia* along the railroad were destroyed in building the double tracks. *Anagallis arvensis,* formerly common at York beach, seems to have disappeared, but occurs on the Isles of Shoals as does *Sedum rosea.* Several species of *Pyrola* and *Moneses uniflora* are common. *Phytolacca americana* used to be very common locally, as farmers raided it under the name of "garget root," to give to their cows. Not long ago I saw a pasture full of it in Berwick. *Typha angustifolia* is common at Wells Beach. *Sanguinaria canadensis* and *Erythronium americanum* are local; *Scrophularia* is also local. *Lychnis flos-cocculi* is profuse in Wells. *Oenothera cruciata* is now locally common. *Aster laevis* is common in York, while *Aster novae-angliae* is common in York, South Berwick, Alfred, and other stations.

The estuary at South Berwick is interesting. Here occur *Tillaea aquatica, Abutilon Theophrasti, Lythrum salicaria, Lilaeopsis chinensis, Samolus parviflora, Limosella subulata, Aster subulatus,* and *Bidens hyper-borea.* Stations of orchids have "grown up" to alders, and many, like *Arethusa* and *Habenaria dilatata,* are now scarce. *Ledum groenlandicum* and *Rhododendron canadense* are now local.



Above. ***Moneses uniflora***
Right. ***Habenaria lacera***

At Shaker Pond in Alfred, *Megalodonta Beckii* was formerly so dense as to impede the progress of a boat. Brothers Irene and Marie-Victorin made a survey and collection of all the plants in the old Shaker grounds and reported some rare *Potamogetons* and *Habenaria leucophaea.*

Most of the plants collected are in the herbaria of Cornell, Albany, Portland, Gray, and Buffalo Museum. I have reported many in "Rhodora" in past years. Obviously one cannot enumerate all and these previouly given have been jotted down without sequence. I feel that anything is likely to turn up in York County, if the discriminating eye searches for it.

ANNUALS OF MEDICINE (from pg. 5)

Even while working on the problem Gosio heard of new cases of arsenic poisoning which cropped up in Holland, Sweden, Germany, and the United States. In the city of Jena, in 1899, a couple was arrested and held on suspicion of murder, when their eleven children died during a seven-year period. They were released when public health officials found the offending wallpaper in their home. By 1900 a law was on the books of the State of Massachusetts, limiting the content of arsenic in paper. Massachusetts wasn't worried exclusively about wallpaper. Banknotes, it seems, were dyed with arsenic compounds, and bank tellers were coming down with cramps. It was apparently easier to change the

dyes than to make tellers use sponges.

This was the history which coroner Ellis had behind his case. Knowing where he stood, he was able to call in expert assistance. The problem went from the offices of the public health officials back to the laboratories of a chemistry professor, Professor Frederick Challenger of the University of Leeds. Challenger was called into action as a consultant and as a recognized authority on the chemical activities of fungi.

By the early 1930's, the advantages had shifted away from *Scopulariopsis* or *Penicillium brevicaulis*. For one thing, research techniques had improved enormously since Gmelin, Fleck, and Gosio wrestled with the angels of death. A contemporary of Gosio, Dr. Biginelli proved that mercuric chloride solutions would trap the poison gas giving arsine-mercury complexes. Abel and Buttenberg in Germany had developed a bio-assay from Biginelli's findings, which was so sensitive that one millionth of a gram of arsenic could be accurately determined. This bio-assay utilized *P. brevicaulis* in a standardized medium and the gas pumped into mercury solutions. In the first decade of the present century, many reports on the formation of gaseous compounds containing metal elements like selenium and tellurium had appeared in the scientific literature. Challenger also had another advantage. Funds were made available to put his knowledge to work. One grant came from the centuries-old Royal Society. Founded in 1662 as the Royal Society of London for Improving Natural Knowledge, and working with an annual government subsidy in return for consulting services, it numbered every top-drawer British scientist from the Restoration to Nationalization on its rolls. Another grant came from the private purse of the Imperial Chemical Industries, Ltd. As a leading dye manufacturer, ICI was laudibly anxious to eliminate all possible danger of poisoning its customers. Within three years, Challenger and his associates wrapped up the case. It turned out that dampening of the arsenic-laden wallpaper and plaster had, as Gosio surmised, produced arsenic oxide. The oxide itself was not particularly toxic as long as it remained on the walls, but the fungus could work on the oxide by a process known as "biological methylation" to convert arsenic oxide into Gosio's gas. The gas itself was shown to be trimethylarsine. The victims had, over a period of time, inhaled increasingly large whiffs of trimethylarsine, which was absorbed in the lungs and carried by the blood to all organs of the body.

By the time trimethylarsine was brought to book at Leeds, both England and the United States had passed laws rigidly restricting the arsenic contents of household items. The increasingly large use of synthetic aniline dyes drove arsenic pigments the way of the horse. Improved materials made houses more weather resistant and, finally, physicians diagnosing cases of trimethylarsine poisoning could take appropriate steps to eliminate the source of gas.

The microscopic filaments of this mold had slain its hundreds cleverly and slowly, gassing them to death without a hint and covering its tracks with a common household smell. Through the efforts of scientists in many countries, the odds have been reduced to almost zero that a person will be gassed by his living-room wall.

VISIT TO EUROPE (from page 3)

markable City Hall, several museums, and Drottingham Palace, built in 1664, with formal gardens in the style of Versailles. Skansen was opened in 1891 and exhibits farmsteads, churches, mills, and other buildings transported from various parts of Sweden. These buildings furnish concrete evidence of how the people of Sweden once lived.

The botanical garden is combined with a commercial nursery and seed house. There is, however, a substantial amount of good plant material on display, including a rock garden. I was interested to note there some trees supplied by the Arnold Arboretum.

No botanist can be in Sweden and fail to make a pilgrimage to Uppsala. On earlier visits I had paid my respects to Linnaeus and the Linnean Garden. This time I had the opportunity of visiting the fine laboratories of Prof. Elias Mylin and discussing with him some problems of mutual interest.

Our stay in London was far too short. A trip up the Thames to Hampton Court gave us an opportunity to see the "Great Vine" planted in 1768 and over six feet in circumference at the base. It is in excellent condition, bearing a heavy crop of grapes so perfect and regularly spaced that for a moment I thought they must be artificial. It is said that the roots of this vine extend to the Thames. We were impressed also with the old English yews at Hampton Court.

Of course, we visited Kew. The palm house was closed because of its condition and will have to be replaced. Dr. N. L. Bor, Assistant Director, called our attention to the oldest tree in Kew. It is a specimen of *Sophora japonica,* two hundred years old and, judging from appearances, near the end of its life span. Kew has about the same area as The New York Botanical Garden and about the same annual attendance. Kew employs forty-eight uniformed police as compared to our handful of guards, and one hundred gardeners and assistants; we have thirty-six.

Everyone, after the shortest of visits to a foreign country, is ready to make generalizations and authoritative pronouncements. I may be excused for recording a few general impressions. It appeared to us that Holland, Denmark, and Sweden were in a more healthy economic state than England or France. The standard of living in Europe is at the bicycle stage as compared to our automobile-television level. We were once again impressed with the cultural richness of Europe, to which time has been an important contributor. The accumulation of books, paintings, public buildings, parks, laboratories, and all the things which go to make a high civilization, comes with time as well as wealth, leisure, and initiative. The ravages of war and consequent economic distress have not prevented Europeans from maintaining their cultural institutions, in some ways more generously than we do here. We frequently asked ourselves how (and why) they can do this and came to the conclusion that it is largely a matter of attitude of the public, a high regard for those things for which cultural institutions stand.

Not the least of the richness of Europe are the collections of living plants in botanical gardens, nurseries, parks, and private estates. Time and time again I saw, in the casual observation such a hurried trip necessitated, trees, shrubs, perennials, and annuals which I longed to bring back with me. The possibility of introducing horticulturally important material to the

United States from far-off places, China or Tibet, is always fascinating —and expensive. There is a wealth of material, in Europe, accumulated over centuries of time, which a knowledgeable horticulturist with a discriminating eye could bring to us.

We returned to the United States with admiration for our colleagues abroad, who have contrived to render devoted service to plant science and horticulture under difficult and trying circumstances, and with the ambition to see our own institutions bear their part in a common effort.

EVERGREEN TREES (from page 15)

feet high and only three feet wide at the widest part of its terete head. Of good color, strong structure, and indifferent as to soil, within reason, this form has been too long neglected in the horticultural trade. Dwarf forms of *P. sylvestris* are also offered by many nurseries, but some are far from true dwarf plants, as, for instance, var. *Watereri.* This does have an excellent blue needle but attains too great a size for more than a few years' usefulness as a small plant. The variety sold as *nana* is of slower growth but makes a heavily-wooded, unhappy-looking plant with thick, contorted needles. *Pinus Mugo* var. *pumilio* tends to develop a prostrate form of limited use and poor appearance. Mr. Slavin has selected and propagated a good, low-growing form of mountain pine which bears his name. These plants seem to have better characteristics, after almost forty years, than many other so-called dwarf types; they are five to six feet in width and between three and four feet in height.

The hemlock has proven a most durable, pest and blight-free tree in many locations, as long as it is not exposed to the contaminated atmosphere of industrial areas, and has been widely used as a park or an estate tree. An excellent dwarf form of *Tsuga canadensis,* grown in Rochester Parks under the name *pumila,* is a most desirable little ornamental evergreen, far superior to the variety often sold as *compacta,* insofar as rate of growth is considered. The plant under observation for the past sixteen years is now but nine feet tall and about twenty-five, or more, years old. Very compact, its broad pyramidal and very symmetric outline is formed by much-ramified branches. The color is similar to that of the parent species. All plants of the variety *compacta,* as seen by the author, at twenty years or older, have attained greater size and they lack the general daintiness of the specimen in Durand-Eastman Park. Surely there is a place for so good a little hemlock in many plantings.

Of the taller-growing evergreens for ornamental and other purposes, some fine forms of *Thuja* merit more frequent use. Along with the fastigiate Scotch pine, where a hardy, columnar form is wanted, *Thuja plicata* var. *fastigiata* is a desirable choice. While the species is described as reaching well over one hundred feet at maturity when growing in natural conditions, even the type will never develop to this extent in cultivation. Growth becomes very slow after thirty to forty years in zone three and southward on the East Coast. The variety *fastigiata,* as seen in Rochester Parks, is of stout structure, well able to withstand storm-damage and to remain erect without support. Our plants have one and occasionally two vertical stems with short, rather stiff lateral branches growing upward, and they develop a slim columnar head, ideal for accent. As a rule, species of *Thuja,* and their varietal forms, do not tolerate very much smoke, winter winds and sun, or prolonged dry spells; but when used in residential or other districts, where sooty air is not prevalent and moderate moisture is available, they do quite well and can be successfully grown with but little attention.

Two very fine evergreens doing very well in the Rochester area are worthy of more attention when medium-sized evergreens are being sought. *Thuja Standishii,* the Japanese arbor-vitae, at thirty-odd years is about eighteen feet high and of broad pyramidal contour, and has pleasing light green foliage. The slightly-drooping branchlet tips give this form an unusual appearance. *Chamaecyparis nootkatensis,* the yellow cedar of the Northwest, is larger at about the same age and in perfect condition. It is of excellent habit and has beautiful dark, bluish green foliage. Being very hardy, this species should do well in almost any temperate zone situations where the genus succeeds. A varietal form of this species, *compacta,* is a much slower grower and much like the type in other respects.

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THE NEW YORK BOTANICAL GARDEN
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COMING FLOWER SHOWS

Ninth Annual Connecticut Spring Flower and Garden Show. This show, to be held March 10-16, 1955, in the West Hartford State Armory, is sponsored by the Hartford Times in cooperation with the Federated Garden Clubs of Connecticut, Connecticut Horticultural Society, Hartford Branch of the National Association of Gardeners, Connecticut Nurserymen's Association, and Allied Florists of Greater Hartford. The theme of the show, the plan of which is being designed by George Hollister who recently retired after serving as Park Director of the City of Hartford many years, will be "Through the Garden Gate —in Springtime."

First State Flower Show in New York. The Federated Garden Clubs of New York State, Inc., are sponsoring the first state flower show to be held in New York. The dates which have been chosen for this undertaking are June 16-19, 1955; the place is the White Plains County Center; the chairman Mrs. Charles Hoffman, Scarsdale, N. Y.

A Bronx Forest 1000 Years B. C.

By **Theodore Kazimiroff**

Mud-covered stump dates back one thousand years B. C.

Again, I am grateful to Dr. Robbins and the staff of The New York Botanical Garden for their invaluable assistance in solving a mystery of three thousand years' standing. My part of this story goes back to a spring day in 1927. My folks had purchased two lots at the auction of the former Westchester Country Club grounds. The great day finally arrived, our house was completed, and we immediately made the drastic change from city cliff dwelling to a pleasant rural way of life.

This all led to a juvenile naturalist's field day. Now I had a cellar to fill. Rocks (I called them geologic specimens), Indian relics, fossils, snakes, turtles, salamanders, hawks, crows, dead and alive, name it — at one time or another my early museum collection made the rest of the family (and at times the few neighbors) really squirm. It did not take me long to discover the waterfront (only one block away) with its myriad contributions to my collecting boxes and bottles — algae, crustaceans, fish of all descriptions, conchological specimens, paleontologic as well as archaeologic specimens, all washed up onto the sands of our neighborhood beach.

In addition to collecting natural history objects, I took time out for fishing, and bait digging (clams and worms) occupied a fair amount of my time. One of my all-utility beaches was the one called Cherry Point Beach. This sheltered cove had a coarse sand and stone beach which at high tide was our swimming beach. A few hundred feet upland was a grassy and tree-covered area that was once home to a roving tribe of Algonquin Indians — as proven by a sub-soil layer of shells, charcoal, and chips of flint and quartz that archaeologists call "shell-heaps" analogous to the Kitchen Middens of European prehistoric man. The storm beach was fronted for the most part by a three to four-foot layer of black, peaty material that formed the root base of centuries of growth of *Spartina patens* — one of the salt marsh grasses. This was all covered by water at normal high tide, but at low tide a glacial boulder-strewn muddy area was exposed at the base of the shelving bank for at least fifty feet. This area was rich in archaeologic artifacts such as arrowheads of flint, jasper, argillite, and quartz, grooved stone axeheads, broken steatite cooking vessels and the like, most of which were undoubtedly washed from above and from the peat layer. The small glacial boulder debris that was exposed at low water was part of my happy hunting grounds. Turned over rocks revealed blood, sand, and tape worms for collecting bottle and bait, small mud and green crabs, elvers and killi fish, gobies and rock eels and numberless other treasures of marine zoology.

It was at about this stage of my education that I made a baffling discovery. I found stumps of large trees, set in mud and only visible when the tide had dropped at least five or six feet. As an amateur botanist, the impact was too great for my peace of mind. I tried to dig out a stump and to my amazement discovered that they were so well rooted that I couldn't budge them. Then I did a survey and found that the stumps also occurred several hundred feet out into areas never exposed at low water. I finally worked out a count of roughly twenty-four stumps that were intact, and several protruding root ends that were mute testimony to the pounding the area took in every southeast or south storm.

The more I pondered the more puzzled I became. What were forest trees doing in six to eight feet or more of water? What caused the area to submerge? When did all this happen? First, I tackled the problem the way I usually did when I wanted local information— I went to the local "old-timers." One of my most invaluable sources of information about local topography, fish and bait conditions, and Indian artifact occurrences was an "old timer" by the name of Morris who, incidentally claimed descendency from the original Morris family of seventeenth century settler fame. He was close to being an octogenarian to my adolescent eyes and led an interesting life as clam and bait digger, fisherman, and gardener to several families. He

told me that those stumps were exactly the same when he was a boy and that he had no idea how they got there.

At least I knew that those stumps were sixty or seventy years old. Then, after further thought, I decided that any submergence of this depth would be mentioned in colonial documents or histories of this area. After many vain trips to the historical society and the collection of the Collis P. Huntington Library, I concluded that if such a catastrophe had occurred it must have been prior to white man's advent.

I decided to do some stratigraphic analyzing of the shelving bank peat layer and I discovered some interesting facts. The top four inches contained evidences of white man's occupancy, such as coal, glass, crockery, and hundreds of fragments of clay pigeons. (Mr. Morris informed me that in the heyday of the Westchester Country Club, Cherry Tree Point was the local trap shooting area. He gave me a graphic description of pre-clay pigeon days, when live pigeons were used as targets and slaughtered by the thousands.) Next, in sectioning the peat layer, I discovered a gravel layer about twenty inches down which contained only beach gravel and Indian artifacts, mostly arrowpoints and debris from their manufacture such as flakes and blanks of flint and quartz. Immediately this proved to me that this shelving bank area, which is always a salt marsh tidal entity, must have built up after the forest submergence took place and by the lack of any colonial occupancy evidence must have been at least three hundred years old.

I tried to cross check with a then newly discovered science, tree ring chronology. I crudely plotted the tree ring pattern (using the wonderful exhibit at the American Museum of Natural History as my guide) and then counted the rings of every stump that the Park Department had left standing in nearby Pelham Bay Park. Nothing gained, I finally decided to consult with the curators of the various museums. I was courteously received, sympathetically listened to, but couldn't sell any antique sunken stumps to anyone.

First the Museum of Natural History, then the Museum of The New York Botanical Garden, and finally, by mail, the Smithsonian in Washington, D.C. I made some interesting friends as a result of my quest, but no one was able to help me. Many a day I spent sitting on my favorite glacial boulder at low tide, wondering if I would ever solve the mystery.

I was able to convince only one person as to the possible antiquity of the stumps, and that was a fellow youthful archaeologist-naturalist, John Johnson. We discussed and argued the pros and cons of the situation and simply decided that our cataclysm had occurred during Indian days.

As the years went by I discovered three other similar areas in the East Bronx, located respectively at Hunter Island, Pelham Bay Park (now covered over by the fill of the present Orchard Beach parking space), another at Castlehill Point, and one at Hunts Point (now covered over by the present Hunt's Point Sewage disposal plant). These other areas, spaced over a distance of six miles, all had several stumps in growth position under about the same tidal exposure circumstances. The impact of losing these sites was not as great, however, as the blow I felt last year when I discovered that my best and last of these stump areas was threatened by sea-wall construction.

I promptly drove back to The New York Botanical Garden and poured my problem into the sympathetic ears of Dr. Robbins. He listened to my description and decided to help investigate my problem. A minor expedition set out the next day with myself, my son Ted Jr., E. N. Mitchell, the staff photographer, Dr. Richard Klein of the Garden's staff, Mrs. Klein, and several men and a truck to dig up and cart off some parts of these stumps for analysis. After much muck-wading and splash-hacking, we managed to return to the Museum with chunks of spongy, mud-covered, unimpressive stump fragments. By what reasoning Dr. Robbins convinced Dr. Willard F. Libby (now of the AEC) that these sad-looking specimens were eligible for the miracle of radio-active carbon dating procedure, I shall never know.

However, the electrifying report came back quite rapidly and one of my life-long ambitions was realized beyond my fondest expectations. Dr. Libby reported that our tree stump samples from the submerged forest were dated back two thousand eight hundred and thirty years with a possible error of two hundred fifty years. It was almost inconceivable but here was evidence that a mighty forest that was growing at the height of the Greek civilization, one thousand years before Christ was born, was suddenly submerged, the trunks rotted off, and the stumps preserved by the briny muck.

To conclude this story, it is interesting to note that on November 5 of this

(Continued on page 26)

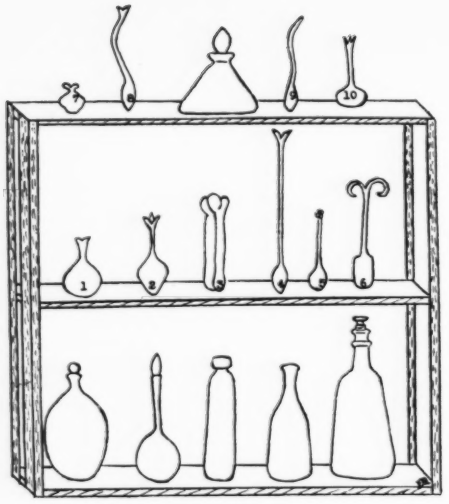
Low tide at Cherry Point Beach on Eastchester Bay from which stump fragments were removed for identification

PETALS *to* PISTILS

FOR THE YOUNGER GENERATION OF GARDENERS

Part IV — PISTILS

By **Elise Ludlam Bowles**



Pistils

1. Hyacinth
2. Mock Orange
3. Tulip
4. Evening Primrose
5. Rose-of-Sharon
6. Sunflower
7. Black Currant
8. Catalpa (A Tree)
9. Cherry (A Tree)
10. Cactus

Bottles — Those Without Numbers

PISTILS are found in the very center of a flower. It makes no difference whether it is an apple blossom, a petunia, a tulip, or some other flower. If that particular flower has a pistil, it will be found in the middle of it. The best way I can describe a pistil is to tell you it looks like a bottle, a very small bottle to be sure. Just as there are fat bottles with short necks and rather thin bottles with long thin necks, so there are fat pistils with short necks and rather thin pistils with long thin necks.

The bottom part of a pistil is called an ovary. It is in this ovary that the seeds are formed. The part that looks like the neck of a bottle is called the style. The very top is the stigma. This is quite sticky. So you see there are three parts to a pistil. These are the ovary, the style, and the stigma. Sometimes the ovary is hidden in the top of the flower stem. Then, of course, only the style and the stigma will show. The flowers of crocus, iris, gladiolus, and honeysuckle all have ovaries that hide down under the petals and sepals.

As for the styles, sometimes they are really quite long, sometimes they are middle-sized, sometimes quite short, and sometimes there are none at all. Every so often it seems as though a pistil had more than one style or more than one stigma. This just means, of course, that the lower parts of two or more pistils have grown together as so often happens in the case of the other flower parts. We say then that the flower has a compound pistil.

When we were hunting for the iris stamens, I told you to look under some things that looked like little petals. These were the styles and stigmas of the iris flower. The styles are all flattened out; they no longer resemble the neck of a bottle. The stigmas are sticky streaks not far from the top of the petal-like style. Can you find the ovary? The other flower parts seem to grow on top of it. If you can find an iris whose sepals, petals, stamens, styles, and stigmas have wilted, you will notice the fat green compound ovary that is probably still there, not the least bit wilted. Cut across this ovary with a vegetable knife. Inside it looks like a pie cut in three pieces. Each piece is the bottom part of a pistil as it looks in cross section. So you see there are three pistils each with a style, instead of one pistil with three. It is possible to see that the same thing is true of many of our larger garden flowers. But the pistils of many more are too tiny to see what is inside them.

I just measured the ovary of a lily. It is now about two months since the petals, sepals, and stamens of the lily flower wilted, but the ovary is still green. At this time it is two and a quarter inches long. Cut across, it looks like a three-cornered pie. This ovary was the lowest part of a compound pistil. Its three styles were joined to make one, but it did have three stigmas. Even these were joined part way. Sometimes such an arrangement is called a single three-lobed stigma. Tulips have three stigmas set right on top of the compound ovary. There is no style.

Rose-of-Sharon also has a compound pistil. If you were to cut across its lowest part, you would discover five pie-shaped pieces. There is only one style. The stigmas look like tiny balls. There are five of them. Be patient though and wait until the flower wilts and shrivels up. There will be left a tiny green football which gets bigger every day. This is the ovary, which you should cut to see what is inside.

Inside the ovaries of big pistils and little pistils grow the egg cells. These and pollen are the two things a flower needs to grow seeds. In one way or another pollen gets onto the sticky stigma. Pretty soon, if it is the right kind of pollen, the egg cells grow into seeds. You saw them growing inside those pie-shaped pieces you were looking at.

Very few flowers can use their own pollen to grow seeds. Almost always it has to come from some other flower of the same kind. In other words, the egg cell of one iris and the pollen of another iris are necessary to grow an iris seed.

Here is where the bees and the butterflies and certain other insects help. They go from flower to flower hunting for nectar. As they go, they are dusted with pollen from one flower and leave that same pollen on the sticky stigma of another flower. Then, if its pollen is ripe, they carry off some of it to yet another flower. We can't see what happens next without the help of a microscope, but we can see that soon the flower wilts and seeds begin to grow. If there were no insects to carry the pollen from flower to flower, we would get no seeds at all of some kinds of flowers. Only a few, like violets and sweet peas, can use their own pollen.

Wind is another big help in carrying the pollen of one flower to the stigma of another. Many trees like the oaks,

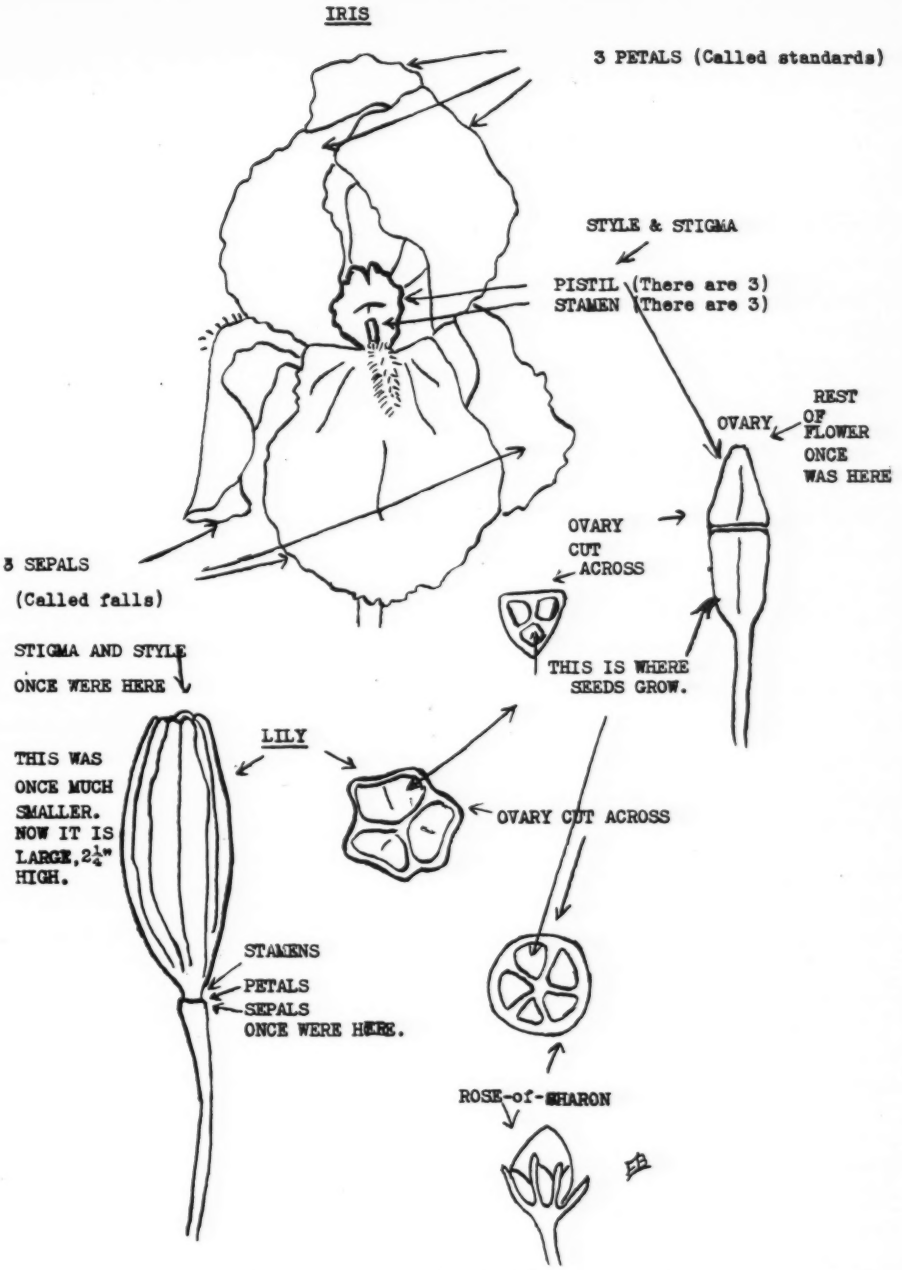
Corn
Ear-silk left; tassel-stamens, right

maples, and willows, have two kinds of flowers. One kind has stamens and no pistils. The other has pistils and no stamens. Both kinds are very tiny. There are no big bright petals to attract the bees and the butterflies, and there is no nectar feast for them. It is the wind that carries the pollen from the flowers that have only stamens to the sticky stigmas of the flowers that have only pistils. Acorns are the seeds of oak trees. If the wind stopped blowing altogether during the time the oak tree's pollen was ripe, no acorns would grow.

Pussy willows have the flowers with stamens on one plant and the flowers with pistils on a different plant. So you see there are pussies with stamens and pussies with pistils, but you won't find them both on one bush. Only the pussies with pistils can grow seeds and only if there is a bush nearby which has pussies with stamens. This is because the wind has to blow the pollen from one bush to the other before any seeds can grow.

Corn also has two kinds of flowers. Those which have only stamens are in the tassels at the top of the corn, as I told you before. What we call the silk of the corn is really a bunch of pistils. The styles of these pistils are sometimes ten inches long. Wind blows the pollen from the tassels high up on the corn plants to the sticky ends of the silks and pretty soon the ovaries which are at the other end of the silks turn into kernels of corn. To get a nice full ear of corn with no spaces between the kernels, each silk in the bunch has to get some pollen on its sticky tip.

Now that we know how pollen has to be carried to the pistil before seeds can grow, let us go look for a hollyhock plant that has three or more flowers on it, or look at the picture I have made. Perhaps there will be some unopened buds at the top. You can see how the green sepals cover and protect the petals. Hollyhocks also have an extra row or so of green leaflike bracts that partly cover the five green sepals. Near the top of the stalk just under the buds you will find a flower just opening. Its petals are spreading out and in the center are the stamens. You remember how the filaments of hollyhock stamens make a tube with the anthers at the top. You can't see any pistils in this flower. Find out if the pollen is ripe by putting your finger on the anthers. If it is, your finger will get yellow. If not, try another flower further down the stalk. As soon as you find one with ripe pollen, you can be sure the bees have found it too. They like the nectar at the bottom of the tube of stamens. In looking for it they are sure to get dusted with pollen just as your finger got dusted with it.



What good is it that the bee gets dusted with pollen, unless there are some sticky stigmas of pistils around? Just look at the flowers lower down on the stalk. Ah! there are the pistils. They have come right up through the center of the stamen tube. But look at the anthers. Some of them are shrivelling. The bee will just have to bring pollen from another flower before seeds can form.

Still further down the stalk you will find a flower whose petals are wilted. Look carefully and you will see a round flat green thing. This is made of the ovaries of the many pistils covered by the sepals and bracts. Later it will turn brown. If you break it apart, then you will find dozens of hollyhock seeds. All this is easier to see, if the flowers are the kind with only five petals. The extra petals of double hollyhocks are stamens which have changed into petals.

Hollyhocks belong to the mallow family of flowers. I told you that in the chapter about stamens. So does the

Hollyhock

Rose-of-Sharon, a shrub which has been popular in gardens ever since the time of George Washington and Thomas Jefferson. It blooms in August and September and has pink, purple, or white flowers. Both hollyhocks and Rose-of-Sharon have the same kinds of flowers, the same arrangement of pistils and stamens. Both may have unopened buds at the top of the stalk or branch, flowers showing only stamens below, and flowers with pistils poking through, below that. Both may have flowers with only five petals or they may have double flowers in which many stamens have changed into petals. You will not find both kinds on the same plant, however.

These family resemblances are interesting to notice. Now that you know something about petals, sepals, stamens, and pistils, you can have fun learning about some of the flower families.

There is that very interesting family of which Jack-in-the-pulpit is a member. Our Easter lilies and our tulips belong to another family. It is huge, bigger than that of the "old lady who lived in a shoe, she had so many children she didn't know what to do." Iris, crocus, and gladiolius could be called cousins. They all belong to one big, beautiful family. The great tall sunflower and the little low dandelion belong to the same family, the largest family of them all. Why? Because they have family likenesses.

DAYLILIES **(from page 11)**

for the first time, might well peruse the list of the one hundred most popular varieties as chosen by the Hemerocallis Society's judges. Descriptions and illustrations of many hundreds of varieties will be found in the catalogues of nurserymen who specialize in these plants. Living plants of daylilies may also be seen in many localities, in home gardens, in display collections in parks, and in the extensive collections of hobbyists.

Some of the older and more extensively propagated clones of excellent quality may be purchased at fifty cents a division, and a price of more than three dollars a division usually indicates newness and, consequently, a more limited supply of the plants.

For the gardener who desires to study the daylilies more or less seriously, there are the yearbooks of the Plant Life Society and the Hemerocallis Society, membership in each of which is open to gardeners at moderate cost.

Any daylily that is hardy in a locality may be propagated easily by division. A newly purchased plant will increase in size naturally by crown branching, and if more plants are wanted it will not be long before the original plant can be divided.

Besides their countless uses in all kinds of home gardens — as specimen plants, in groups, or combined with other plants in the herbaceous border — daylilies are admirably suited for naturalizing along brooks, ponds, on cliffs, in meadows and in broken woodland areas. For whatever purpose they are considered, in fact, daylilies offer both permanence and unquestionable ornamental value.

EDITOR'S COMMENTS

In the 1953 awards and honors of the Hemerocallis Society, the Stout Medal winner was the variety 'Revolute' whose originator is H. P. Sass. 'Rose Gem,' originated by Dr. A. B. Stout, was one of ten varieties which received the Award of Merit, and 'Ming' and 'Challenger,' both recent Stout introductions, were among the twenty-seven varieties which received honorable mention.

In the Society's Popularity Poll for 1953, 'Orange Beauty' (H. P. Sass) was chosen "Queen"; introduced in 1945, it won the Award of Merit in 1950. 'Painted Lady' (Russell) which held first place the last three years, stepped down into second place; introduced in 1942, it won the Award of Merit in 1950 and the Stout Medal in 1951.

Of the top ten in the 1953 Popularity Poll, 'Cabellaro' (Stout 1941) and 'Painted Lady' (Russell 1942) have been there on all the polls. 'Georgia' (Stout 1946) is also among the top ten; and nine other Stout introductions, 'Dauntless,' 'Linda,' 'Ming,' 'Patricia,' 'Taruga,' 'Rosalind,' 'Afterglow,' 'Bertrand Farr,' and 'Dominion' are among the one hundred varieties which make up this poll.

HEDGES AND SCREENS **(from page 13)**

characteristics and add a different touch to the garden scene.

Forsythias—especially *F. media spectabilis* — can be pruned into a solid hedge, so can weigela 'Eva Radtke' and 'Bristol Ruby'. If properly pruned, the Japanese quince *(Chaenomeles japonica)* will make an excellent hedge, very bright in May with its orange-scarlet or scarlet-red flowers, depending upon the particular form selected, and a protective barrier, too, because of its sharp spines. Spiraeas are frequently used for flowering hedges — *arguta, prunifolia plena, Thunbergii* and *Vanhouttei*. Bear in mind that spiraeas and other flowering shrubs must be trimmed after flowering, if your hedge is to present a tidy appearance.

BRONX FOREST **(from page 23)**

year I made a trip to the site with Earl Ubell, Science Editor of the N. Y. Herald Tribune, and to my amazement discovered two of the stumps had been in the way of progress, necessitating their removal by derrick. There they were high and dry on the pitiful remnants of my once beautiful beach.

I contacted A. C. Pfander, Administrator of the Garden, and he promptly ordered one of the stumps to be removed for cleansing and preparation for exhibit. Tentatively, Mr. Pfander and I have discussed plans for a permanent exhibit of this stump and other botanic relics of our Borough. The Hon. James Lyons, Borough President, has finally gotten his wish. Now the Bronx has everything! California may have its three-thousand year redwoods, Arizona its petrified forest, but now the Bronx has the oldest forest on the Atlantic seaboard—even if it is only a sunken forest three thousand years old.

BOOK REVIEWS

LAUGHTER ON THE STAIRS. Beverley Nichols. 254 pages, with drawings by William McLaren. E. P. Dutton, New York. 1954. $3.75.

Everyone who read and loved *Merry Hall* may look forward to the same pleasure in reading *Laughter on the Stairs*. Beverley Nichols has developed and enlarged the story so charmingly begun in *Merry Hall*. *Laughter on the Stairs* is a gracefully told history of a lovely Georgian house and its restoration to its pristine glories through the taste and knowledge of its owner. Although this book is more devoted to the interior of the house and its rescue from the horrors wreaked upon it by a former owner, yet, throughout, you are conscious of the exquisite garden and its guardian angel "Oldfields." Such gardeners are born, not made!

Mr. Nichols writes with such a sensitivity and affection for the past that reading this book is a most satisfying experience. The daily events of life at "Merry Hall" are humorously depicted with a delicate irony that amuses but never wounds. Mr. Nichols writes also very wisely and with a profound understanding of what he calls the "rare uplands." No one will read *Laughter on the Stairs* without experiencing that glorious feeling that comes to us all on a sun-drenched morning after a wonderful rain. For delightful reading, your reviewer recommends *Laughter on the Stairs*.

ANGELA MOORE PLACE
New York, N. Y.

THE GIANT CACTUS FOREST AND ITS WORLD. Paul Griswold Howes. 258 pages, illustrated, indexed. Duell, Sloan & Peace, New York (also Little, Brown & Co., Boston, Mass.). 1954. $7.50.

Central Arizona attracts over two million visitors each winter who remain for more than one night, according to the most conservative estimate. To most of them, the flora and fauna are astonishing and most interesting. All of them seek information from Arizonans who are unable, for the most part, to answer their questions.

Therefore *The Giant Cactus Forest and its World* will be welcomed both by visitors and Arizonans. Paul Griswold Howes, a keenly observant naturalist, has assembled very authentic information on the plants, animals, birds, reptiles, and insects associated with the giant cactus of Arizona and has presented that information in non-technical language and with copious illustrations.

The cacti and the trees and shrubs and even some of the most prominent wild flowers are described so well that it is hardly necessary to refer to the excellent photographs to recognize them easily. The animals, birds, and reptiles are described, and their habits and food preferences woven into interesting stories that are never pedantic.

His word pictures of the desert, its sunrises and sunsets, its teeming life and continuous color changes are nearly as good as a trip to the Giant Cactus Forests and will create a desire to view those wide vistas and strange inhabitants.

Forty-one of the birds that may be seen in the winter season are combined in one full-page color plate prepared by J. Edmund Sawyer, and some of the black and white photographs of birds are credited to Harry L. and Ruth Crockett.

The staff of the Desert Botanical Garden of Arizona spend ten months of each year answering the questions of our one hundred and fifty thousand annual visitors on all sorts of desert subjects, and we note that nearly all of the usual questions are answered in Paul Griswold Howes' book.

W. TAYLOR MARSHALL, *Director*
Desert Botanical Garden of Arizona

101 WILDFLOWERS OF OLYMPIC NATIONAL PARK. Grant and Wenonah Sharpe. 40 pages, illustrated, indexed. University of Washington Press, Seattle, Wash. 1954. 75¢.

This booklet is strictly popular in approach. The plants are divided — with a few errors —into groups by the color of the flowers, and then individually described and illustrated. The line drawings are generally excellent, even though without much technical detail. The common names are from *Standardized Plant Names*. The scientific names are somewhat erratic, notably in that what is from the drawing and description evidently *Chrysanthemum leucanthemum* is here called *Bellis perennis*.

ARTHUR CRONQUIST

GUIDE TO POPULAR FLORAS OF THE UNITED STATES AND ALASKA. S. F. Blake. 56 pages, indexed. U. S. Dept. of Agriculture Bibliographical Bulletin No. 23. U. S. Government Printing Office, Washington, D. C. 1954. 25¢.

Over three hundred popular floras are described briefly but sufficiently in this bulletin to enable the reader to visualize the contents and the probable usefulness to him of each. The publisher and price are included in the data. The floras are conveniently grouped geographically by regions or states.

DAVID D. KECK

GARDEN FRIENDS AND FOES. Richard Headstrom. 219 pages, illustrations, appendix. Ives Washburn, Inc., New York. 1954. $3.50.

Mr. Headstrom inclines toward the friends, especially birds. He is enthusiastically specific on the numbers and kinds of insects eaten by the various types of birds and gives detailed help on ways to attract birds, including a list of plant material, measurements for roosting and nesting boxes, and ways to outwit cats. Other animals of value mentioned briefly are bats, shrews, skunks, toads and frogs, spiders, snakes, lizards, turtles, and earthworms. Squirrels and moles appear on both the helpful and harmful lists; mice, rabbits, woodchucks, pocket gophers, raccoons, porcupines and deer are listed as sometimes harmful; rats, nematodes, mites, centipedes, snails and slugs, sow bugs and pill bugs are given as wholly destructive.

Useful insects are accorded two pages, injurious insects fifty-five, weeds twenty-seven, plant diseases twenty-nine. The cataloging of garden foes gives the gardener an interesting overall picture of what he is up against, but the insects and diseases are taken up in no particular order, the control measures are summarized in a separate section, and there is no index to correlate the two. The treatment is necessarily too brief to be of much help in diagnosis and control of specific problems, and the reader, who wishes to consult the books from which the author has made his summary, will be disappointed at the lack of bibliography.

CYNTHIA WESTCOTT
Glen Ridge, N. J.

THE EVERBLOOMING GARDEN. Norman Taylor. 104 pages, illustrated, indexed. D. Van Nostrand, New York. 1954. $2.

Anything that Norman Taylor considers good enough to print is above average, and this slim book is no exception. In fact, it is easily worth more than a dozen ordinary garden books for those who are advanced enough, or ambitious enough, to want to try what he suggests herein, namely, to have bloom the year round and the seasons through without annuals, and without resort to a greenhouse or a professional supplier of seasonal plants. We can all subscribe to this objective.

In the words of the jacket writer, "Winter drabness need not cloud your gardening efforts, if you follow the expert advice of Norman Taylor in this unique guide to all-year gardening beauty. The proper selection and care of herbs, bulbs, trees and shrubs can add splashes of color and striking combinations you've hardly dreamed of before to your winter garden."

The same applies to the summer garden where there are always blank spots, unless one goes to the pains of filling it with annual flowering plants and vines. Mr. Taylor knows plant materials and their possibilities in different latitudes and environments. Many of the plants he recommends have no popular names, and some may be difficult to obtain from ordinary nurserymen and suppliers. That need be no deterrent, however, as part of the fun is to dig up (discover, that is) plant material that not everyone in the community has. And some of these things, even old species and varieties, such as franklinia and *Jasminum nudiflorum* are not too easy to find. *Styrax japonica*, a wonderful little tree, I do not even find in his list. Yet it is perfectly hardy in southern Connecticut, where I live, and has such beautiful flowers like tiny white bells hanging underneath graceful branches in June.

There are nice decorations but no illustrations of plant material listed. A bibliography and complete index add to the usefulness of the book.

ANDREW S. WING
Riverside, Conn.

FRUIT IN THE GARDEN. Norman Taylor. 134 pages, illustrated, indexed. D. Van Nostrand, New York. 1954. $2.50.

To plant or not to plant — that is the question with fruit. Mr. Taylor brings us up to date in a very practical, sensible, and interesting way in this small handbook, which packs in more usable information than is contained in many longer manuals and in scores of government bulletins. He has strained the good from the bad and given us his long years of experience as a horticulturist and a home gardener in the New York area and on the eastern shore of Maryland. Also, he is well known by his other works on gardening and especially Taylor's *Encyclopedia of Gardening*.

There is advice as to what to plant in various sections of the country, only the more important varieties for the home gardener and fruit grower being listed.

Bush, stone, and pome fruits are covered, also grapes and blueberries. No attempt is made to cover the species only hardy in the

hotter parts of the country. How to plant, fertilize, prune, train, and protect from insects and diseases are discussed briefly but succinctly. We feel that Mr. Taylor knows whereof he speaks, especially when it pertains to varieties and cultural directions; also he takes pains to advise against the phoney plants and remedies that are being forced into our vision today from the pages of newspapers and even some of the reputable garden magazines. Mr. Taylor has no time for "wonder plants" and "magic" cure-alls.

If one were to criticize, it would be to suggest that a few more illustrations would have added value and interest to the book; also, in some cases, a little more detail. But this is being rather too critical of an otherwise first-class handbook. Mr. Taylor's sense of humor and proportion help to brighten everything that he writes.

ANDREW S. WING
Riverside, Conn.

GARDENS AND GARDENING. VOLUME 5. LABOUR-SAVING PLANNING AND PLANTING. Edited by F. A. Mercer and Roy Hay. 144 pages, illustrated, indexed. Studio Crowell, New York. 1954. (Printed in Great Britain.) $4.50.

Of this small volume, two chapters are devoted to garden construction: "Garden Surfacing and Paving" by S. G. Boakes, and "Screens, Arbours, Garden Houses" by A. D. B. Wood. Both chapters contain excellent advice on constructional detail and are illustrated with very fine photographs of well-chosen garden features discussed in their respective chapters. Illustrations of some handsomely designed gates are an example of how inspirational good garden pictures can be.

The chapter, "Labour-Saving Flowering Trees and Shrubs" by Frederick Street is but a few random notes — and a generous list of interesting plant material, a large part of which could be well recommended in this country, although some difficulty would be realized in finding sources of some of the less common plants mentioned. Photographs of individual plants are superb.

"Shrubs for Ground Cover" by A. T. Johnson places much emphasis on the various and worthy heaths, which might be featured in many more American gardens, if they did not require a specific kind of setting and special soil preparation. A planting of heaths at one end of the Thompson Memorial Rock Garden in The New York Botanical Garden, which has been established for about twenty years, is proof that such a planting can be very effective outside the native habitat of these modest plants. Most of the shrubs listed as ideal groundcover are adaptable for American gardens, but the list is far from complete and omits some of our finest plants for this purpose, such as *Arctostophylos, Ilex,* and *Pachysandra.* It is surprising to find in this chapter an excellent full-page illustration of our native *Cornus canadensis* — the lowly bunch-berry.

If these preceding chapters leave much to be desired, one should not despair for the last two chapters are well worth the price of the book. J. L. Beddall has very ably written on "Hedges," and N. P. Harvey has done a masterly piece of writing in "The Economy of the Rose."

Mr. Beddall writes of hedges as screen or shelter; to divide a garden into smaller plots; to form vistas; to provide background to beds and borders. Choice of plant material is discussed as well as soil preparation, planting, and training. You do not wonder about the magnificance of many English hedges, when you read that six feet is not too wide a strip to prepare for any hedge except the very smallest — and, of course, double digging is prescribed.

Mr. Harvey, writing on roses, stresses the longevity of rose plants as easily bringing them into the labor-saving category — with hybrid teas and floribundas being good for fifteen years, ramblers and shrub roses being satisfactory over many years. Excellent advice is given on roses for hedges, how beds should be planned and planted, the question of under-planting in rose beds, choice of climbers and ramblers and where they can be used to greatest advantage.

An outstanding comment of his is this: "One of the undoubted fascinations of rose growing is that so many problems of cultivation are still unsolved. At present it is impossible, save in a very few instances, to lay down hard and fast rules. There is no final answer as regards pruning, no perfect way of manuring and feeding and many unexplained factors regarding resistance and susceptibility to disease attack." Following this is much excellent advice on choosing a site, planting, pruning, pests and diseases — advice well-upholstered with good common sense and based on an intimate knowledge of growing roses generally — intimate knowledge of culture for individual types and varieties. There are lists of roses for various purposes which, unfortunately for us, include mostly varieties not listed by domestic rose merchants.

HOWARD W. SWIFT

SOIL AND FERTILIZER PHOSPHORUS IN CROP NUTRITION. Agronomy: A Series of Monographs, Vol. IV. Edited by W. H. Pierre and A. G. Norman. 492 pages, illustrated, indexed. Academic Press, New York. 1953. $9.

Volume IV of Agronomy includes twenty-nine papers presented at a symposium on the subject at University of Illinois, Urbana, August 26-28, 1952, under the auspices of the American Society of Agronomy.

These papers deal with all phases of phosphoric acid from mining to manufacture for fertilizer use, including details on world resources and distribution, functions in the production of crops, availability of phosphoric acid under acid and limed soils conditions of both the organic and inorganic forms.

The volume generally brings together most of our knowledge on phosphoric acid as it applies to the present and future food production problem. Each chapter represents the thinking of plant and soils scientists throughout the world, if the numerous references cited with each paper is any criterion of the field covered.

The value of the volume for the layman is in making available a list of references. The papers are all aimed at the plant or soils investigator or teacher who has a background training in the subject. The layman would find the reading of the papers rather difficult, unless he has a particular interest in some phase of phosphorous nutrition in the plant.

It is to be regretted that each chapter was not accompanied by a summary in less technical wording to make it more readable to the layman. For the student it is an invaluable reference work.

V. A. TIEDJENS, *Director of Research*
"Na-Churs" Plant Food Co.
Marion, Ohio

SWEET CORN. Economic Crops, Volume IV. Walter A. Huelsen. Z. I. Kertesz, Editor. 409 pages, illustrated, indexed. Interscience, New York. 1954. $10.50.

This, the fourth of a series of monographs devoted to economic crops, is a comprehensive presentation of the history, botany, growing, and commercial uses of sweet corn. The contents may be logically separated into three major sections. The first four chapters cover the history, botany and breeding of sweet corn. Following this, four chapters are devoted to the physiology, growth, role of environment and nutrition of the plant. The final six chapters deal almost entirely with problems relating to the sweet corn processing industry. This latter section of the book contains much previously unpublished or widely scattered information. The author's close association with the canning industry over a period of many years has enabled him in these latter chapters to set forth many little known facts relating to sweet corn ranging all the way from the problems of seed production to those concerned with the details of processing the crop as a vegetable. This section is perhaps the most important contribution of the book and should serve as a useful reference to sweet corn breeders, seed producers and the sweet corn processing industry.

In view of Professor Huelsen's experience as a sweet corn breeder, some readers may be disappointed at his somewhat superficial treatment of the subject of breeding. Although one chapter is devoted to "Breeding Sweet Corn Hybrids," a small fraction only of this chapter deals with breeding theory and methods.

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One cannot fail to be impressed by the multitudinous references cited by the author, but it is the reviewer's opinion that a less extensive but more critical list of citations might have been equally or even more useful to the student. One also looks for but usually does not find an attempt at evaluation by the author of much conflicting evidence cited throughout the book. These, however, are only minor criticisms of a job which is, in general, well done. The volume should be a useful addition to the bookshelves of all those working with maize.

WILLIAM L. BROWN
Dept. of Plant Breeding
Pioneer Hi-Bred Corn Co.
Johnston, Iowa

THE CULTIVATION OF ANIMAL AND PLANT CELLS. Philip R. White. 239 pages, illustrated, indexed. Ronald Press, New York. 1954. $6.

Since its practical realization in the early "twenties" the study of isolated plant organs, tissues, and cells *in vitro* has assumed considerable importance in various phases of plant physiology, biochemistry, and morphology. With these techniques biologists have been able to examine the effects of chemicals and of physical forces on cells which are free of the modifying influences of the remainder of the organism. Zoologists and animal physiologists antidated botanists in these fields by about a decade but the botanical workers were first in developing completely synthetic media which would support the growth of roots, plant embryos, etc.

Dr. White, who was among the early monographers of plant cell and tissue culture, has attempted to collate the theories and procedures used for the study of the growth and metabolism of isolated cell masses of both plant and animal origins. From the botanical point of view the present volume adds little that was not given in more detail in his Manual of 1943. Yet, even the simplification may be of advantage to the newcomer to the field.

The book is copiously illustrated with detailed photographs and diagrams. Dr. White writes with considerable verve, and his examples are well chosen. One must, however, recommend that this book be used by botanists in conjunction with his earlier volume and those by Gautheret and Nobecourt. The animal workers may profitably use Dr. White's book to great advantage.

RICHARD M. KLEIN

PIONEER PLANT GEOGRAPHY. The Phytogeographical Researches of Sir Joseph Dalton Hooker. 267 pages, illustrated, indexed. Martinus Nijhoff, 9 Lange Voorhout, The Hague, Netherlands. 1953. $6.50.

As the subtitle implies, this is a large series of extracts from the journals of J. D. Hooker brought together by W. B. Turrill, Keeper of the Herbarium at the Royal Botanic Gardens at Kew. The writer has attempted to "lay concisely before the reader the major contributions of J. D. Hooker to the study of plant distribution and to evaluate these contributions from the subsequent work of many botanists." It is not easy to give any sort of continuity to a work which by its very nature is highly discontinuous, but a large measure of it has been achieved by the book's organization. The ends of the earth were literally the only bounds to Hooker's phytogeographic interests, and the book has been divided into a series of chapters, each one involved with one of the principal areas in which Hooker studied, e.g., the Arctic, Syria and Palestine, India, Africa, etc. A chapter consists of numerous quotations from Hooker's writings held together by usually brief comments of the compiler; it is concluded by a comparison of Hooker's views with those of more recent phytogeographers. In addition the volume is illustrated by a number of Hooker's own field sketches.

It is fair, I think, to say that while this volume is not one that the reader will want to complete at one sitting, it is in many places very interesting and there can be little doubt that the author has done an admirable job in presenting J. D. Hooker as one of the foremost of the pioneer plant geographers.

RICHARD S. COWAN

GARDENING IN THE LOWER SOUTH. H. Harold Hume. 377 pages, illustrated, indexed. Macmillan, New York. Revised edition 1954. $7.50.

Gardening in the Lower South, first published in 1929 and re-issued in 1948, has been brought out in this new, up-to-date edition. Dr. Hume has also added two fine chapters on camellias and daylilies.

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Adams, Charlotte. Easter Idea Book. New York, Barrows, 1954. $3.50.

Advances in Enzymology and Related Subjects of Biochemistry. New York, Interscience Publishers, 1954. Vol. 15. $11.00.

Archer, Sellers G. and Bunch, Clarence E. American Grass Book; a Manual of Pasture and Range Practices. Norman, Univ. of Oklahoma Press, 1953. $3.95.

Benson, Lyman and Darrow, Robert A. Trees and Shrubs of the Southwestern Deserts; 2nd ed. Tucson, Univ. of Arizona Press, and Albuquerque, Univ. of New Mexico Press, 1954. $8.50.

Blackman, F. F. Analytic Studies in Plant Respiration. New York, Cambridge Univ. Press, 1954. $7.50.

Blane, Gertrude. Flower Box Surprise. New York, Julian Messner, 1953. $1.60.

Cheesman, Evelyn. Insects; Their Secret World. New York, William Sloane Assoc., 1953. $3.50.

Demeree, M., Editor. Advances in Genetics. New York, Academic Press, 1954. Vol. 6. $9.80.

Eadie, W. Robert, Animal Control in Field, Farm, and Forest. New York, Macmillan, 1954. $3.75.

Eckey, E. W. Vegetable Fats and Oils. New York, Reinhold Publishing Corp., 1954. (Amer. Chem. Soc. Monograph Ser. No. 123): $16.50.

Gojdics, Mary. The Genus Euglena. Madison, Univ. of Wis. Press, 1953. $6.50.

Green, G. Gilbert. Cacti and Succulents. New York, Pitman Publishing Co., 1953. $7.00.

Gregg, John R. Language of Taxonomy; an Application of Symbolic Logic to the Study of Classificatory Systems. New York, Columbia Univ. Press, 1954. $2.50.

Gurr, Edward. Practical Manual of Medical and Biological Staining Techniques. New York, Interscience Publishers, 1953. $4.00.

Haynes, Williams. Cellulose, the Chemical that Grows. Garden City, N. Y., Doubleday, 1953. $4.00.

Jones, F. Wood. Trends of Life. New York, St. Martin's Press, 1953. $1.50.

Lawrence, G. H. M. and others. Plant Genera, Their Nature and Definition: a Symposium. Waltham, Mass., Chronica Botanica, 1953. (Chronica Botanica Vol. 14, No. 3.) $2.00.

Leaders in American Science. Vol. 1, 1953-1954. Nashville, Who's Who in American Education, 1953. $12.00.

Manks, Dorothy S. and Parker, Katherine V., comps. Motion Pictures for Garden Club Programs. Boston, Mass. Horticultural Society, 1954. $.25.

Melady, John Hayes. Home Owners' Complete Garden Handbook. New York, Grosset, 1954. $2.95.

Popular Gardening Ideas. New York, Arco Publishing Co., 1954. $2.00.

Roan, H. M. Cactus and Other Succulent Plants; 3d ed. New York, British Book Centre, 1952. $3.00.

Sampson, Kathleen and Western, J. H. Diseases of British Grasses and Herbage Legumes; 2nd ed. New York, Cambridge Univ. Press, 1954. $3.00.

Shewell-Cooper, W. E. The Royal Gardeners: King George VI and His Queen. New York, British Book Centre, 1952. $2.50.

Smith, George. Introduction to Industrial Mycology; 4th ed. New York, St. Martin's Press, 1954. $6.00.

Society for General Microbiology. Autotrophic Micro-organisms. (Fourth Symposium of the Society.) New York, Cambridge Univ. Press, 1954. $5.00.

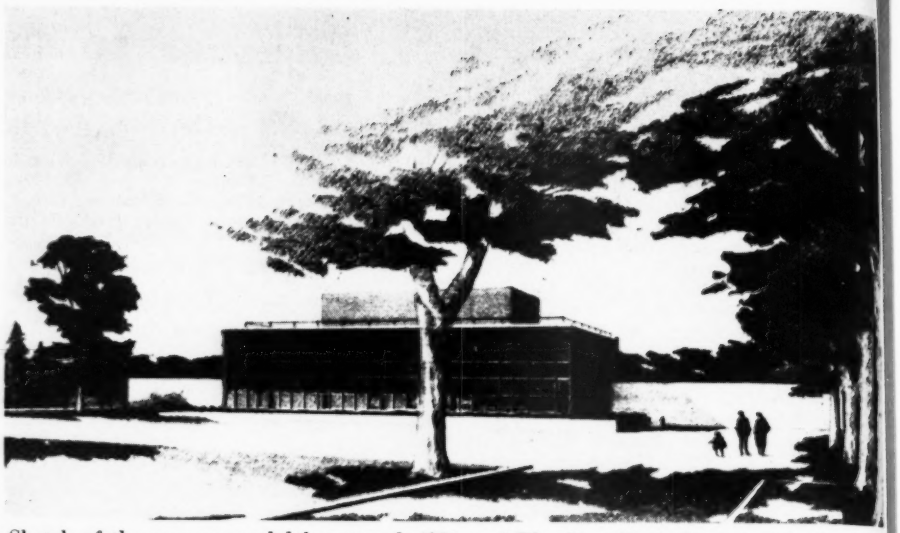
Spry, Constance. Constance Spry Anthology. New York, Studio Publications, 1954. $4.75.

Sunset Western Garden Book. Menlo Park, Cal., Lane Publishing Co., 1954. $2.95.

Swift, Loret. Flower Arranging Book. New York, Arco Publishing Co., 1954. $2.00.

Talbert, Thomas J. Growing Fruit and Vegetable Crops. Philadelphia, Lea and Febiger, 1953. $5.00.

NEWS, NOTES and COMMENTS



Sketch of the new research-laboratory building of The New York Botanical Garden, for which ground was broken on Nov. 30, by the architects, Brown, Lawford and Forbes.

Ground Breaking Ceremonies for Research-Laboratory. Ground for the new research-laboratory building was broken on November 30. Stuart Constable, Chief Park Designer, represented Robert Moses, Commissioner of Parks of the City of New York, and lifted the first shovelful of soil with Mrs. Harold I. Pratt, Chairman of the City Relations Committee of The New York Botanical Garden. Charles B. Harding, President of The New York Botanical Garden, welcomed the members of the Garden, city officials, and others assembled to witness the ceremonies, and Dr. William J. Robbins briefly addressed the gathering.

Dr. Robbins said that the "research-laboratory is the culmination of a dream of thirty years. I have here in my pocket a pamphlet, written in 1925 when Dr. Frederick Lee was President of The New York Botanical Garden. Now, twenty-nine years later, we are turning over the earth —the beginning of the research-laboratory building. The program, which we anticipate carrying on in this building, will be concerned with the study of biologically important chemical compounds found in plants. Botanical gardens, as you probably remember, were originally established because it was felt that plants and herbs were important biologically, and botanical gardens were needed in order to grow such plants.

"With the development of synthetic organic chemistry, plants as a source of biologically important compounds were forgotten. Now the interest in them and the importance of them as sources of such materials have once more come to the forefront, and this building—and the staff in it—will combine biological, botanical, and chemical methods to take on the function and identification of such compounds. It will be a laboratory which will, I am sure, contribute to the health, wealth, and well-being of the people of this country and other countries."

1955 Downtown Lecture Series. Four illustrated lectures will be held in the auditorium of the French Institute Building, 22 East 60th Street, New York City, as follows: January 6, "Gardens Yesterday and Today," American garden design—its heritage and its future, by Mary Deputy Cattell, Landscape Architect; January 13, "Plant Hormones," current uses of hormones and similar growth-controlling substances, short-cuts in everyday gardening and horticulture, by Dr. George S. Avery, Jr., Director, Brooklyn Botanic Garden; January 20, "Horticultural Highlights of the Caribbean Islands," kodachromes will show the best of the tropical flora, introduced and native, in the islands from the Bahamas to Trinidad, by Dr. Richard A. Howard, Director, The Arnold Arboretum; January 27, "Spring Bulbs," special emphasis on superior varieties in a moderate price range, by T. H. Everett, Horticulturist and Curator of Education of The New York Botanical Garden, and James S. Jack, Superintendent of the Mrs. Joseph G. DeFina estate, Rye, N. Y.

Fee for the entire series, for members of The New York Botanical Garden, is $4.00; for non-members, $6.00.

The 1955 Downtown Lecture Series are sponsored by the Volunteer Associates of The New York Botanical Garden. Mrs. John D. Beals, Mrs. Melvin E. Sawin, and Mrs. Clarance Stanley are Honorary Chairmen of the Lecture Committee; Mrs. Oakley Sheldon is Chairman; Mrs. Percy L. Douglas, Mrs. Benjamin F. Few, and Mrs. Charles G. Stradella, Vice-Chairmen. Members of the committee are, Mrs. James C. Brady, Mrs. Jonathan F. Butler, Mrs. Charles Doscher, Mrs. Barent Lefferts, Mrs. Madison H. Lewis, Mrs. John E. Lockwood, Mrs. Clifford D. Mallory, Mrs. Hermann G. Place, Mrs. Donald Scott, Mrs. Henry Steeger, Mrs. John G. Winchester.

Staff members of the Garden, T. H. Everett, Curator of Education and Horticulturist, Miss Elizabeth C. Hall, Librarian, and Dr. P. P. Pirone, Plant Pathologist, comprise the 1955 Program Committee.

Edgar A. Whitney, A.W.S., is examining the work of one of his students in the class for Flower Painting for Amateurs at The New York Botanical Garden

Dr. Frederick C. Robbins Among Nobel Prize Winners. Dr. Frederick C. Robbins, son of Dr. William J. Robbins, Director of The New York Botanical Garden, and Mrs. Robbins, of Bronxville, N. Y., will be among those to be presented with the Nobel Prize on December 10 in Stockholm, Sweden, by King Gustav VI.

Dr. Robbins, Dr. Thomas H. Weller, of the Boston Children's Hospital of Harvard University, and Dr. John F. Enders, also of Harvard, who headed the team, were chosen in the field of medicine and physiology to receive this high award for their work in developing a new weapon in the fight against poliomyelitis. Their joint investigation resulted in the discovery of a method of growing polio virus in tissue cultures; and thus it was possible to grow enough polio virus of the three known strains to carry out the nationwide Salk polio vaccine program in the United States this past year.

An arrangement of dried plant material—leaves of sago palm *(Cycas revoluta)* and lotus *(Nelumbium nelumbo)*, pods of *Spathodea* and palmetto "boots" (ends of the leaves which are attached to the trunk) were effectively arranged in an Hawaiian poi bowl on a wooden oval stand and dark green mat by Mrs. Stafford Hendrix at an International Flower Show

Dr. Robbins is professor of Pediatrics at the Western Reserve Medical School in Cleveland and is Chief of the Department of Pediatrics and Contagious Diseases at Cleveland City Hospital. He studied at the University of Missouri and Harvard University and served in the Army Medical Corps during World War II. Last year, Dr. Robbins and Dr. Weller were co-winners of the Mead Johnson award for their contributions to pediatrics research.

Display of Dried Plant Material. The Special Display Committee—Mrs. Charles Burlingham, Chairman, Mrs. Richard S. Meredith, and Mrs. Donald Straus—is arranging an exhibit of dried leaves, flowers, and seed pods of tropical and native plant material to open in the Museum and Administration Building about the middle of January. Mrs. Stafford Hendrix and Mrs. Eric Thomee, members of the Hortulus Club of Greenwich, Conn., will make arrangements demonstrating how the material may be used in artistic compositions.

Among the material to be included in the exhibit are dried artichoke blossoms, leek blossoms, pods of *Paulownia tomentosa* and of the wild cucumber vine, pods and branches of *Liquidambar Styraciflua* and *Koelreuteria paniculata*, okra, yarrow, cockscomb, dock, mullen, sumac, bush clover, hazelnut calyx, and ostrich and cinnamon ferns.

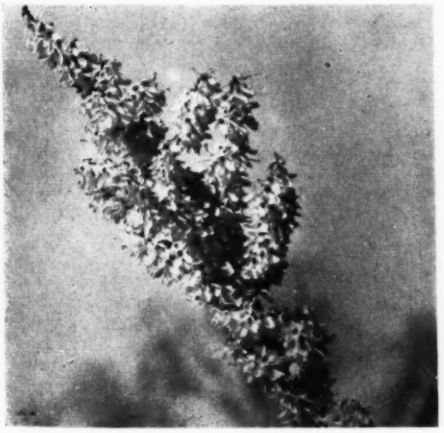
Wayside Garden's 1955 Introductions. Among the plant novelties which are being offered by Wayside Gardens this coming spring are four distinctive shrubs, *Abeliophyllum distichum* and *Cytisus Battandieri*, tamarix 'Pink Cascade' and rose 'Freuhling's Gold.'

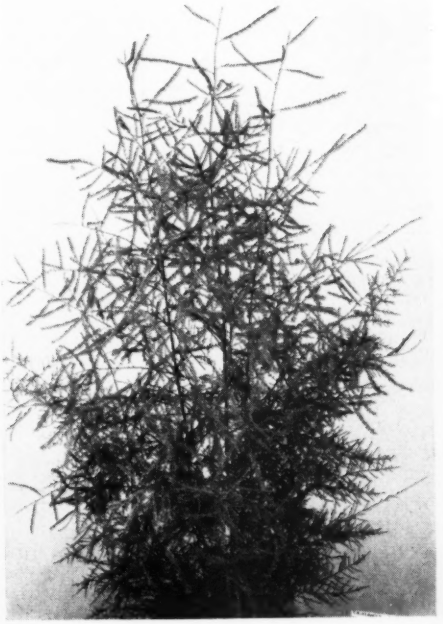
Abeliophyllum distichum was found in Korea in 1919, but was not introduced to England until 1932. This hardy, deciduous shrub is splendid for the small garden as it is a compact grower and seldom more than three feet high. The deep purple flower buds are produced in the autumn in a mild climate and open in February. The flowers are pale pink when they open but fade to white. Although the flowers will stand some frost, *A. distichum* should be planted where it will not be exposed to cold winds. A background of evergreens shows this shrub off to its best advantage.

Cytisus Battandieri from North Africa has golden-yellow flowers in late May and June, in eight clusters not unlike a lilac. They have a pleasing pineapple-like fragrance. The leaves, green above, silvery beneath, make this shrub conspicuous throughout the summer. *C. Battandieri* is best grown in a warm, sunny, well-drained location; it has survived winter temperatures as low as zero in Mentor, Ohio.

Tamarix 'Pink Cascade' bears its cascading panicles of flesh-pink flowers during a time when not many other shrubs are in bloom—from July into September—and well above the rich blue-green foliage. This shrub does very well at the seashore.

Rosa spinosissima 'Fruehling's Gold' develops into a nice clump three to five feet high; the canes are covered for eighteen inches from the top down with sweetly-scented, cup-shaped, golden-yellow flowers. It is a fine hardy rose for the shrub border—has withstood temperatures as low as 10° below zero in Mentor, Ohio.





Above. Tamarix 'Pink Cascade'
Left. *Abeliophyllum distichum*
Right. Rose 'Freuhling's Gold'

Flower Paintings and Flower Arrangements at Metropolitan Museum of Art. Of interest to botanists, horticulturists, and flower lovers was the exhibition of Flower Paintings in the Metropolitan Museum of Art from Oct. 30 - Dec. 19. Half of the sixty-five paintings, prints, and drawings of flowers were from the collection of Mrs. Roy Arthur Hunt of Pittsburgh; the others were from the Museum's collections.

The earliest work on view was the representation of a dill plant from a fragment of a German herbal manuscript, dated about 1410; the most recent a water color drawing of orchids by the Russian-Ameri-

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LET THERE BE HERBS

Modern gardeners find the most exciting time of the year to be the dead of winter, when the new seed catalogs appear. Then everything is possible and will grow "bigger, better, and resistant to all pests" in the glowing language of the ad writers. The herb fancier is a backwards kind of catalog reader, however, and is apt to be found deep in the latest reprint of a

"Catalogue of divers Ordinary Herbs and Roots, by the View whereof, any Gardener may readily call to mind what sorts of Herbs he is to provide for the Furnishing of his Garden" dated 1688, and written by Leonard Meager, printed by J. Rawlins, at the Three Daggers in Fleet Street.

Originally appearing as "The English Gardener" and reprinted twelve times before 1721, this very practical little book has some advanced ideas. The placing of small seeds in a white paper, "not much open towards the end," and shaking them gently into the furrow is good garden practice today.

"Remember that slight and seldom watering daily, and but slight watering, yea, in a hot and dry time, will do more hurt to young-rooted Herbs, than if you did not water at all: therefore I say, that when you water in a dry season, do it thoroughly and pretty constant. . . ." Could be one of our modern garden writers speaking, couldn't it? The phrases are a little more flowery, but the methods of cultivation of a garden have not changed in two centuries really.

More than a dozen plans for small gardens have been provided by the author, including one or two elaborate designs that look like mazes called "Wilderness Works."

In the days when the gardener was depended upon by the cook to provide all that was green and esculent, it was not unusual for him to have a word to say about its preparation. Leonard Meager lists things that are "pickled for Sallets to use in Winter."

Cucumbers, purslain, tarragon, summer savoury, broom buds, elder buds, onions, leeks and 'hartichoaks' are very acceptable. Also some make a 'boil'd sallet' of the young and tender stalks of both 'turneps' and cabbages, "when they first run up in the Spring." The seed heads were referred to here no doubt, because in England such crops live over.

A pretty sort of garnish that must have had the piquancy of mint sauce was made by putting the following flowers with white wine vinegar and sugar: clove-gelly-flowers, cowslip flowers, bugloss flowers, burage flowers and arch-angel flowers (the blossoms of dead nettle, *Lamium maculatum.*).

GERTRUDE B. FOSTER

NEWS (from page 29)

can artist, Andrey Annoff (1884-1949).

On October 30 and 31, thirty flower arrangements were made by members of the Garden Club of America and displayed in the galleries devoted to two special exhibitions—the Flower Paintings already mentioned above and Dutch Painting, the Golden Age, an international loan of nearly one hundred paintings by seventeenth century artists.

Identification of the plant material in many of the Flower Paintings, prepared by T. H. Everett, Curator of Education and Horticulturist, and E. J. Alexander, Assistant Curator of The New York Botanical Garden, appeared on labels.

Advisory Council's New Officers. The following are the new officers of the Advisory Council: Mrs. John D. Beals, Jr., Chairman; Mrs. John E. Parsons, First Vice-Chairman; Mrs. John E. Lockwood, Second Vice-Chairman; Mrs. Richard de Wolfe Brixey, Treasurer; Mrs. Harold Ruckman Mixsell, Recording Secretary; Mrs. Antonie P. Voislawsky, Corresponding Secretary.

First World Orchid Conference. The conference, sponsored by the American Orchid Society, Inc., with the cooperation of the Missouri Botanical Garden and the Orchid Society of Greater St. Louis, proved an unqualified success. The conference was broken into several sessions—What Makes a Fine Orchid?, Recent Advances in Orchid Knowledge, the Professional Growers, the Public Education, the Amateur Growers, Science and Research—each with pertinent papers and a panel discussion. Many of these valuable papers will be published in the Bulletin of the American Orchid Society.

During the conference dates, October 15-17, 1954, an orchid show was held at the Missouri Botanical Garden to which orchids were flown from Japan, Australia, Brazil, Hawaii, and Europe, as well as from growers throughout the United States.

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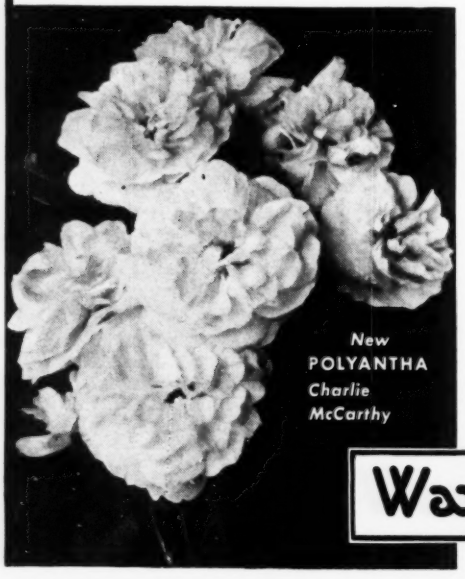

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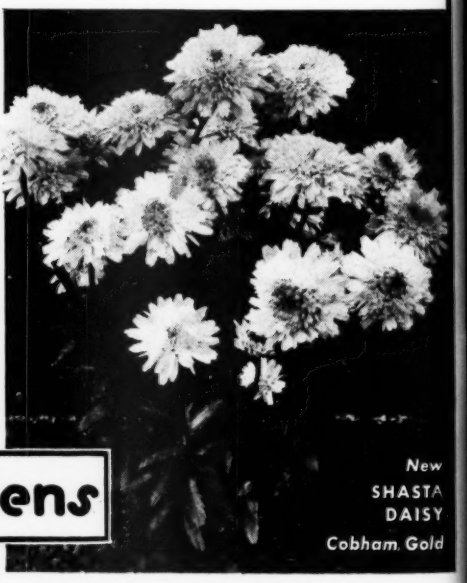

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